

**INSTALLATION MANUAL
FOR SEA TEL 6012-33 KU-BAND
BROADBAND-AT-SEA VSAT ANTENNA SYSTEM**



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Sea Tel Marine Stabilized Antenna systems are manufactured in the United States of America.



Sea Tel is an ISO 9001:2008 registered company.

Certificate Number 13690 issued March 14, 2011.

R&TTE CE

The Series 12 Maritime Satellite Earth Station complies with the requirements of directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on Radio equipment and Telecommunication Terminal Equipment. A copy of the R&TTE Declaration of Conformity for this equipment is contained in this manual.



The Sea Tel Series 12 antennas will meet the off-axis EIRP spectral density envelope set forth in FCC 47 C.F.R. § 25.222(a)(1)(i) when the input power density limitations, listed in our FCC Declaration, are met..

These antenna systems also contain FCC compliant supervisory software to continuously monitor the pedestal pointing accuracy and use it to control the "Transmit Mute" function of the satellite modem to satisfy the provisions of FCC 47 C.F.R. § 25.222(a)(1)(iii).

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Revision History

REV	ECO#	Date	Description	By
A	10147	November 29, 2012	Production Release	MDN
B	N/A	February 20, 2013	Added RF M&C chapter, updated text & drawings	MDN
B1	N/A	February 27, 2013	Added RTT&E Declaration	MDN
C	N/A	March 29 2013	Added 81" Radome information & drawings to the manual.	MDN
D	N/A	November 20, 2013	Expanded installation, and maintenance chapters, updated all text to include GSR6 software changes, added Commission Wizard, AZ Trim (GSR6) Modem Interface and BUC M&C chapters.	MDN

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R&TTE Declaration of Conformity

Sea Tel Inc. declares under our sole responsibility that the products identified below are in compliance with the requirements of:

DIRECTIVE 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on Radio equipment and Telecommunication Terminal Equipment and the mutual recognition of their conformity.

Product Names: **3612 Ku Band 8/16 Watt Tx/Rx Maritime Satellite Earth Station**
 4009 MK3 Ku Band 16 Watt Tx/Rx Maritime Satellite Earth Station
 5012 Ku Band 8/16 Watt Tx/Rx Maritime Satellite Earth Station
 6012 Ku Band 8/16 Watt Tx/Rx Maritime Satellite Earth Station

These products have been assessed to Conformity Procedures, Annex IV, of the above Directive by application of the following standards:

EMC:

EMC standard for Radio Equipment (Maritime)
EMC standard for Radio Equipment (Common)
EMC standard for Radio Equipment (General)
Marine Navigational and Radio Communication
Equipment and Systems – General Requirements:

ETSI EN 301 843-1 V1.4.1 (2004-06)

ETSI EN 301 489-1 V1.4.1 (2002-08)

ETSI EN 300 339 (1998-03)

IEC EN 60945:2002

Satellite Earth Stations and System (SES):

Harmonized EN for Very Small Aperture
Terminals (VSAT):
Harmonized EN for satellite Earth Stations
on board Vessels (ESVs)

ETSI EN 301 428-1 V1.3.1 (2006-02)

ETSI EN 302 340 V1.1.1 (2006-04)

Safety:

Safety of Information Technology Equipment:

IEC EN 60950-1:2001 (1st Edition)

Certificates of Assessment were completed and are on file at NEMKO USA Inc, San Diego, CA and BACL Labs, Santa Clara, CA.



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Date: 03-04-2013



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FCC Declaration of Conformity

1. Sea Tel, Inc. designs, develops, manufactures and services marine stabilized antenna systems for satellite communication at sea. These products are in turn used by our customers as part of their Ku-band Earth Station on Vessels (ESV) networks.
2. FCC regulation 47 C.F.R. § 25.222 defines the provisions for blanket licensing of ESV antennas operating in the Ku Band. This declaration covers the requirements for meeting § 25.222 (a)(1) by the demonstrations outlined in paragraphs (b)(1)(i) and (b)(1)(iii). The requirements for meeting § 25.222 (a)(3)-(a)(7) are left to the applicant. The paragraph numbers in this declaration refer to the 2009 version of FCC 47 C.F.R. § 25.222.
3. Sea Tel hereby declares that the antennas listed below will meet the off-axis EIRP spectral density requirements of § 25.222 (a)(1)(i) with an N value of 1, when the following Input Power spectral density limitations are met:

*0.6 Meter Ku Band, Models 2406 and USAT-24 are limited to	-21.6 dBW/4kHz
*0.75 Meter Ku Band, Models 3011 and USAT-30 are limited to	-21.6 dBW/4kHz
0.9 Meter Ku Band, Model 3612 is limited to	-20.3 dBW/4kHz
1.0 Meter Ku Band, Models 4003/4006/4009/4010 are limited to	-16.3 dBW/4kHz
1.0 Meter Ku Band Model 4012 is limited to	-16.6 dBW/4kHz
1.2 Meter Ku Band, Models 4996/5009/5010/5012 are limited to	-14.0 dBW/4kHz
1.5 Meter Ku Band, Models 6006/6009/6012 are limited to	-14.0 dBW/4kHz
2.4 Meter Ku Band, Models 9797 and 9711QOR are limited to	-14.0 dBW/4kHz
4. Sea Tel hereby declares that the antennas referenced in paragraph 3 above, will maintain a stabilization pointing accuracy of better than 0.2 degrees under specified ship motion conditions, thus meeting the requirements of § 25.222 (a)(1)(ii)(A). Those antennas marked with * will maintain a stabilization pointing accuracy of better than 0.3 degrees. The Input Power spectral density limits for these antenna have been adjusted to meet the requirements of § 25.222 (a)(1)(ii)(B).
5. Sea Tel hereby declares that the antennas referenced in paragraph 3 above, will automatically cease transmission within 100 milliseconds if the pointing error should exceed 0.5 degrees and will not resume transmission until the error drops below 0.2 degrees, thus meeting the requirements of § 25.222 (a)(1)(iii).
6. Sea Tel maintains all relevant test data, which is available upon request, to verify these declarations.

Peter Blaney, Chief Engineer
Sea Tel, Inc
Concord, CA

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1. **Series 12 Ku-Band System Configuration(s)**

The Series 12 Ku-Band Stabilized Antenna system is to be used for Transmit/Receive (TX/RX) satellite communications. It is comprised of two major groups of equipment: the Above Decks Equipment (ADE) and the Below Decks Equipment (BDE). There will also be interconnecting cables between the ADE & BDE and cables to provide other inputs to the system.

It is initially equipped for Ku-Band operation; however, an optional Ka-Band upgrade kit is available for when the Ka-Band services are available.

1.1. System Cables

AC power and coaxial cables are discussed in a separate chapter.

1.2. Other Inputs to the System

Multi-conductor cables from Ship's Gyro Compass, GPS, phone, fax and computer equipment may be connected in the system.

1.3. Simplified Block Diagram of a Series 12 Ku-Band System

Your Series 12 Ku-Band TXRX system consists of two major groups of equipment: an above-decks group and a below-decks group. Each group is comprised of, but is not limited to, the items listed below. All equipment comprising the Above Decks is incorporated inside the radome assembly and is integrated into a single operational entity. For inputs, this system requires only an unobstructed line-of-sight view to the satellite, Gyro Compass input and AC electrical power.

A. Above-Decks Equipment (all shown as the ADE) Group

- Stabilized antenna pedestal
- Antenna Reflector
- Feed Assembly with Cross-Pol and Co-Pol LNBS
- 8W Ku-Band Solid State Block Up-Converter (BUC)
- Radome Assembly

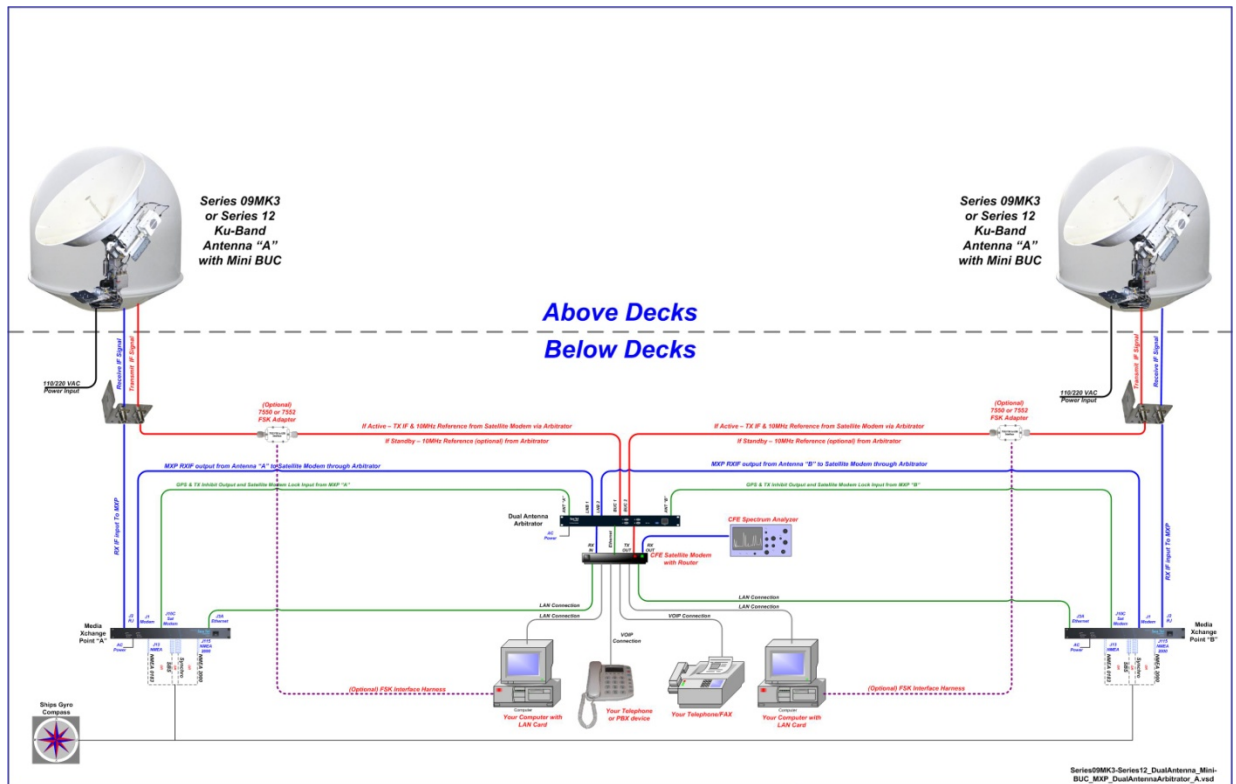
B. Below-Decks Equipment Group

- Media Xchange Point™ (MXP)
- Customer Furnished Equipment - Satellite Modem and other below decks equipment required for the desired communications purposes (including LAN and VOIP equipment).
- Appropriate Coax, Ethernet, and telephone cables



Due to very large blockage conditions, you may need to install a dual antenna configuration to provide uninterrupted services. Two full antenna systems are installed and the MXP control outputs are connected to an arbitrator switch panel which then is connected to the below decks equipment. The connection scheme is required for MXP "A" to control ONLY Antenna "A" AND MXP "B" to control ONLY Antenna "B".

When one antenna is blocked, its blockage output will command the arbitrator panel to switch services to the modem from that antenna to the other antenna. The arbitrator panel provides a logic latch to prevent excess switching when the ship heading is yawing, therefore, causing if the antenna to be repeat blocked – unblocked – blocked.



1.5. *Open Antenna-Modem Interface Protocol (OpenAMIP™) Specification:*

1.5.1. Overview:

OpenAMIP™, an ASCII message based protocol invented and Trademarked by iDirect, is a specification for the interchange of information between an antenna controller and a satellite modem. This protocol allows the satellite modem to command the MXP (via TCP port 2002) to seek a particular satellite and allows exchange of information necessary to permit the modem to initiate and maintain communication via the antenna and the satellite. In general, OpenAMIP™ is ONLY intended to permit a modem and the MXP to perform synchronized automatic beam switching when using an iDirect Network. It is **NOT** a status logging system or a diagnostic system. In addition, OpenAMIP™ is intended for a typical installation whereby a specific satellite modem and antenna system is properly configured to work together. The protocol does not make specific provisions for auto-discovery or parameter negotiation. It is still the responsibility of the installer to ensure that the parameters of both the satellite modem (proper option files) and the MXP/ICU (setup parameters) are compatible for the intended satellite(s).

1.5.2. Interface requirements:

1.5.2.1. Hardware

Sea Tel Media Xchange Point (MXP)

Any Satellite modem manufacturer that is compatible with OpenAMIP™

CAT5 Patch cable

1.5.2.2. Software

Sea Tel MXP software version (latest).

1.5.3. Utilized OpenAMIP™ Commands:**1.5.3.1. Antenna Commands:**

Command	Description	Example
S f1 f2 f3	Satellite Longitude, 3 parameters: Degrees E/W (-value equals West), Latitude Variance (Inclined Orbit), Sat Skew Offset	"S -20.1 1.0 3.5"
P c1 c2	Polarization, 2 parameters: H,V,L, or R	"P L R"
H f1 f2	Tracking Frequency: 2 Parameters: Center Frequency and Bandwidth in MHz	"H 1100.500 0.256"
B f1 f2	Down Conversion Offset: 2 parameters: LNB (Receive) Local Oscillator and BUC (TX) L.O.	"B 10750"
F	Find, Target satellite using existing S, P,R, and H Parameters	
A i	Set keep alive in seconds (0 = off)	"A 5"
L b1 b2	Modem Lock and free to transmit. 2 parameters: b1 indicates Rx lock and b2 (not utilized) enables/disables Tx Mute to BUC	"L 1 1"
W i	GPS Update: Sets GPS Update period in seconds (0 = Off)	"W 300"
I s1 s2	Set modem vendor (s1) and device (s2) 2 parameters:	"I iDirect 5100"

1.5.3.2. Modem Commands:

Command	Description	Example
a i	Set keep alive in seconds (0 = off)	"a 5"
i s1 s2	Set Antenna Vendor (s1) and device (s2) 2 parameters:	"i Sea Tel DAC-2202"
s b1 b2	Antenna Status: 2 parameters: b1 is functional status and b2 is Tx allowed	"s 1 1"
w b1 f1 f2 t1	Set GPS Position: 4 parameters: b1 is validity flag, f1 is latitude, f2 is longitude, and t1 is timestamp	"w 1 38.222 122.123 0"

2. Site Survey

There are three objective of the site survey. The first is to find the best place to mount the antenna and the BDE. The second is to identify the length and routing of the cables and any other items or materials that are required to install the system. The third is to identify any other issues that must be resolved before or during the installation.

2.1. Site Selection Aboard The Ship

The radome assembly should be installed at a location aboard ship where:

- The antenna has a clear line-of-sight to view as much of the sky (horizon to zenith at all bearings) as is practical.
- X-Band (3cm) Navigational Radars:
 - The ADE should be mounted more than 0.6 meters/2 feet from 2kW (24 km) radars
 - The ADE should be mounted more than 2 meters/8 feet from 10kW (72 km) radars
 - The ADE should be mounted more than 4 meters/12 feet from 160kW (250km) radars
- S-Band (10cm) Navigational Radars:
 - If the ADE is/has C-Band it should be mounted more than 4 meters/12 feet from the S-band Radar.
- The ADE should not be mounted on the same plane as the ship's radar, so that it is not directly in the radar beam path.
- The ADE should be mounted more than 2.5 meters/8 feet from any high power MF/HF antennas (<400W).
- The ADE should be mounted more than 4 meters/12 feet from any high power MF/HF antennas (1000W).
- The ADE should also be mounted more than 4 meters/12 feet from any short range (VHF/UHF) antennae.
- The ADE should be mounted more than 2.5 meters/8 feet away from any L-band satellite antenna.
- The ADE should be mounted more than 3 meters/10 feet away from any magnetic compass installations.
- The ADE should be mounted more than 2.5 meters/8 feet away from any GPS receiver antennae.
- Another consideration for any satellite antenna mounting is multi-path signals (reflection of the satellite signal off of nearby surfaces arriving out of phase with the direct signal from the satellite) to the antenna. This is particularly a problem for the onboard GPS, and/or the GPS based satellite compass.
- The ADE and the BDE should be positioned as close to one another as possible. This is necessary to reduce the losses associated with long cable runs.
- This mounting platform must also be robust enough to withstand the forces exerted by full rated wind load on the radome.
- The mounting location is robust enough that it will not flex or sway in ships motion and be sufficiently well re-enforced to prevent flex and vibration forces from being exerted on the antenna and radome.
- If the radome is to be mounted on a raised pedestal, it **MUST** have adequate size, wall thickness and gussets to prevent flexing or swaying in ships motion. In simple terms it must be robust.

If these conditions cannot be entirely satisfied, the site selection will inevitably be a “best” compromise between the various considerations.

2.2. Antenna Shadowing (Blockage) and RF Interference

At the transmission frequencies of C and Ku band satellite antenna systems, any substantial structures in the way of the beam path will cause significant degradation of the signal. Care should be taken to locate the ADE so that it has direct line-of-sight with the satellite without any structures in the beam path through the full 360 degree ships turn. Wire rope stays, lifelines, small diameter handrails and other accessories may pass through the beam path in limited numbers; however, even these relatively insignificant shadows can produce measurable signal loss at these frequencies.

2.3. Mounting Foundation

2.3.1. Mounting on Deck or Deckhouse

While mounting the ADE on a mast is a common solution to elevate the ADE far enough above the various obstructions which create signal blockages, sometimes the best mounting position is on a deck or deckhouse top. These installations are inherently stiffer than a mast installation, if for no other reason than the design of the deck/deckhouse structure is prescribed by the ship's classification society. In the deck/deckhouse design rules, the minimum plating and stiffener guidelines are chosen to preclude high local vibration amplitudes.

Most installations onto a deck or deckhouse structure will require a mounting pedestal to raise the ADE above the deck for radome hatch access and to allow the full range of elevation (see ADE mounting considerations above). Some care must be taken to ensure the mounting pedestal is properly aligned with the stiffeners under the deck plating.

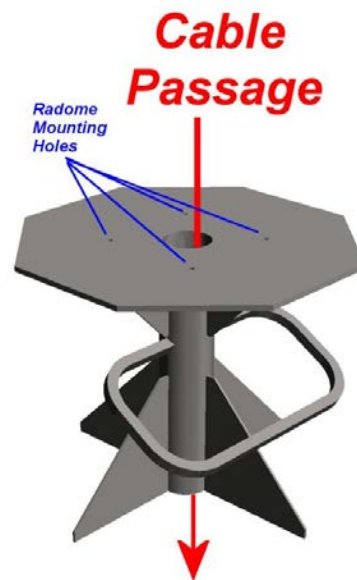
2.3.2. ADE Mounting Considerations

Mounting the radome directly on the deck or platform prevents access to the hatch in the base of the radome unless an opening is designed into the mounting surface. If there is no access to the hatch, the only way to service the antenna is to remove the radome top. Two people are required to take the top off of the radome without cracking or losing control of it, but even with two people a gust of wind may cause them to lose control and the radome top may be catastrophically damaged (see repair information in the radome specifications).

If access to the hatch cannot be provided in the mounting surface, provide a short ADE support pedestal to mount the ADE on which is tall enough to allow access into the radome via the hatch.

Ladder rungs must be provided on all mounting stanchions greater than 3-4 feet tall to allow footing for personnel safety when entering the hatch of the radome.

The recommended cable passage in the 50, 60 and 66 inch radomes is through the bottom center of the radome base, down through the ADE support pedestal, through the deck and into the interior of the ship.



2.3.3. Sizing of the support pedestal

The following should be taken into account when choosing the height of a mounting support stand:

1. The height of the pedestal should be kept as short as possible, taking into account recommendations given in other Sea Tel Guidelines.
2. The minimum height of the pedestal above a flat deck or platform to allow access into the radome for maintenance should be 0.6 meters (24 inches).
3. The connection of the ADE mounting plate to the stanchion and the connection of the pedestal to the ship should be properly braced with triangular gussets (see graphic above). Care should be taken to align the pedestal gussets to the ship's stiffeners as much as possible. Doublers or other reinforcing plates should be considered to distribute the forces when under-deck stiffeners are inadequate.
4. The diameter of the pedestal stanchion shall not be smaller than 100 millimeters (4 inches). Where the ADE base diameter exceeds 1.5 meters (60 inches), additional stanchions (quantity greater than 3) should be placed rather than a single large stanchion.
5. Shear and bending should be taken into account in sizing the ADE mounting plate and associated gussets.
6. Shear and bending must be taken into account when sizing the pedestal to ship connection.
7. All welding should be full penetration welds –V-groove welds with additional fillet welds – with throats equivalent to the thickness of the thinnest base material.
8. For an ADE mounted greater than 0.6 meters (24 inches) above the ship's structure, at least one (1)

foot rung should be added. Additional rungs should be added for every 0.3 meter (12 inches) of pedestal height above the ship's structure.

9. For an ADE mounted greater than 3 meters (9 feet) above the ship's structure, a fully enclosing cage should be included in way of the access ladder, starting 2.3 meters (7 feet) above the ship's structure.

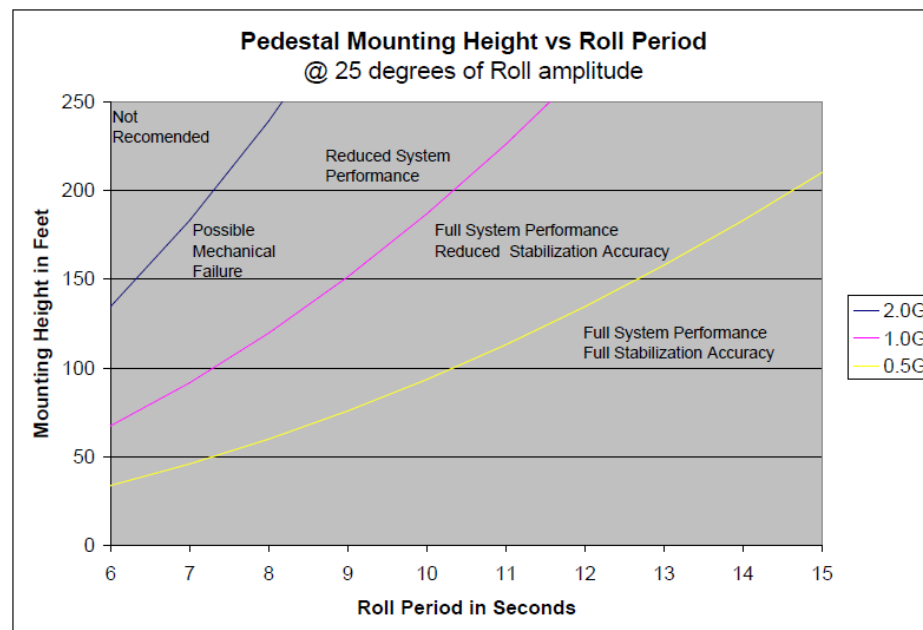
2.4. Mounting Height

The higher up you mount the antenna above the pivot point of the ship the higher the tangential acceleration (g-force) exerted on the antenna will be (see chart below).

When the g-force exerted on the antenna is low, antenna stabilization and overall performance are not affected.

If the g-force exerted on the antenna is high enough ($> 1\text{ G}$), antenna stabilization and overall performance are affected.

If the g-force exerted on the antenna is excessive (1-2 Gs), the antenna does not maintain stabilization and may be physically damaged by the g-force.



2.5. Mast Configurations

Sea Tel recommends mounting the ADE in a location that has both a clear line-of-sight to the target satellites in all potential azimuth/elevation ranges and sufficient support against vibration excitement. If possible, mounting the ADE pedestal directly to ship deckhouse structures or other box stiffened structures is preferred. However, in many cases, this imposes limits on the antenna system's clear line-of-sight.

Often the solution for providing the full azimuth/elevation range the antenna needs is to mount the ADE on the ship's mast. Unfortunately, masts do not consider equipment masses in design and often have harmonic frequencies of their own.

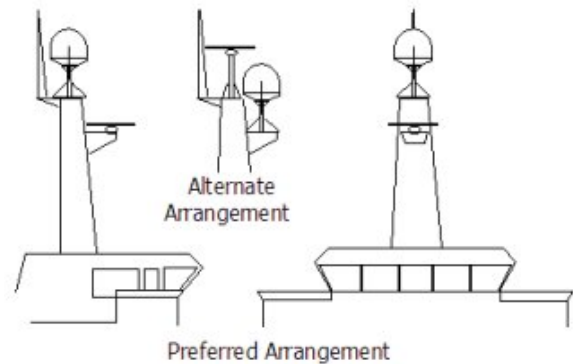
There are many designs of masts used on ships – masts are nearly as unique in design as the ship is – but the designs often fall into a few categories. These categories can be addressed in terms of typical responses and problems with regards to vibration and mounting of ADE. The most common categories of masts are:

2.5.1. Vertical Masts

Vertical masts are a very ancient and common mast design. In essence, it is the mast derived from the sailing mast and adapted for mounting the ever-increasing array of antennae which ships need to communicate with the world. This drawing of a vertical mast shows the preferred mounting of the ADE center-line above the plane of the radar. Alternatively the ADE is mounted below the plane of the radar signal

Vertical masts are most commonly found on cargo ships – they are simple, inelegant and functional. They are also fairly stiff against torsional reaction and lateral vibrations, as long as the ADE is mounted on a stiff pedestal near the vertical centerline of the mast. If centerline mounting is impractical or otherwise prohibited, the mast platform the ADE is mounted on should be checked for torsional vibration about the centerline of the mast and the orthogonal centerline of the platform.

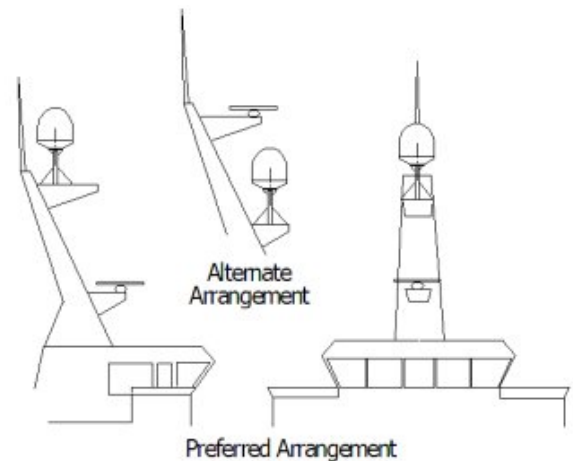
If the estimated natural frequency of the mast or platform is less than 35 Hertz, the mast or platform should be stiffened by the addition of deeper gussets under the platform or behind the mast.



2.5.2. Raked Masts

Raked masts are found on vessels where the style or appearance of the entire vessel is important. Again, the inclined mast is a direct descendant from the masts of sailing ships – as ship owners wanted their vessels to look more unique and less utilitarian, they 'raked' the masts aft to make the vessel appear capable of speed. This drawing shows a raked mast, again with the preferred ADE mounting above the radar and alternate with the ADE below the radar.

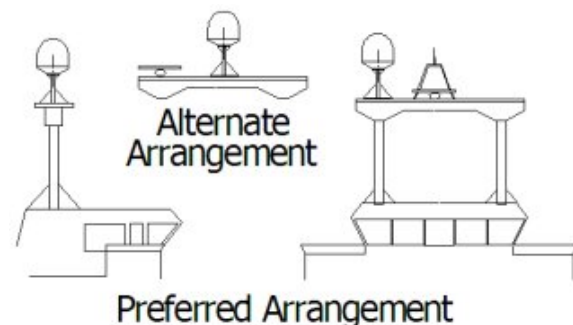
Raked masts pose special problems in both evaluating the mast for stiffness and mounting of antennae. As can be seen in the drawing, all antennae must be mounted on platforms or other horizontal structures in order to maintain the vertical orientation of the antenna centerline. This implies a secondary member which has a different natural frequency than the raked mast's natural frequency. In order to reduce the mass of these platforms, they tend to be less stiff than the main box structure of the raked mast. Thus, they will have lower natural frequencies than the raked mast itself. Unfortunately, the vibratory forces will act through the stiff structure of the raked mast and excite these lighter platforms, to the detriment of the antenna.



2.5.3. Girder Masts

Girder masts are large platforms atop a pair of columns. Just like girder constructions in buildings, they are relatively stiff athwart ship – in their primary axis – but less stiff longitudinally and torsionally. An example of a girder mast is shown in this drawing, with the preferred ADE mounting outboard and above the radar directly on one of the columns and alternate with the ADE centered on the girder above the plane of the radar.

The greatest weakness of girder masts is in torsion – where the girder beam twists about its vertical centerline axis. As with all mast designs discussed so far, mounting the antenna in line with the vertical support structure will reduce the vibration tendencies. Mounting the antenna directly above the girder columns provides ample support to the antenna pedestal and locates the antenna weight where it will influence the natural frequency of the mast the least.



2.5.4. Truss Mast

Truss masts are a variant on the girder mast concept. Rather than a pair of columns supporting a girder beam, the construction is a framework of tubular members supporting a platform on which the antennae and other equipment are mounted. A typical truss mast is shown in this photograph.

Like a girder mast, truss masts are especially stiff in the athwart ship direction. Unlike a girder mast, the truss can be made to be nearly as stiff in the longitudinal direction. Truss masts are particularly difficult to estimate the natural frequency – since a correct modeling includes both the truss structure of the supports and the plate/diaphragm structure of the platform. In general, the following guidelines apply when determining the adequate support for mounting an antenna on a truss mast:

1. Antenna ADE pedestal gussets should align with platform stiffeners which are at least 200 millimeters in depth and 10 millimeters in thickness.
2. When possible, the antenna ADE pedestal column should align with a vertical truss support.
3. For every 100 kilograms of ADE weight over 250 kilograms, the depth of the platform stiffeners should be increased by 50 millimeters and thickness by 2 millimeters.

Sea Tel does not have a recommended arrangement for a truss mast – the variability of truss mast designs means that each installation needs to be evaluated separately.



2.6. Safe Access to the ADE

Safe access to the ADE should be provided. Provisions of the ship's Safety Management System with regard to men aloft should be reviewed and agreed with all personnel prior to the installation. Installations greater than 3 meters above the deck (or where the access starts at a deck less than 1 meter in width) without cages around the access ladder shall be provided with means to latch a safety harness to a fixed horizontal bar or ring.

The access hatch for the ADE shall be oriented aft, or inboard, when practical. In any case, the orientation of the ADE access hatch shall comply with the SMS guidelines onboard the ship. Nets and other safety rigging under the ADE during servicing should be rigged to catch falling tools, components or fasteners.

2.7. Below Decks Equipment Location

The Antenna Control Unit, Terminal Mounting Strip and Base Modem Panel are all standard 19" rack mount, therefore, preferred installation of these items is in such a rack. The ACU mounts from the front of the rack. The Terminal Mounting Strip and Base Modem Panel mount on the rear of the rack.

The Satellite Modem, router, VIOP adapter(s), telephone equipment, fax machine, computers and any other associated equipment should be properly mounted for shipboard use.

Plans to allow access to the rear of the ACU should be considered.

2.8. Cables

During the site survey, walk the path where the cables will be installed. Pay particular attention to how cables will be installed; such as what obstacles they will be routed around, difficulties that will be encountered and the overall length of the cables. The ADE should be installed using good electrical practice. Sea Tel recommends referring to IEC 60092-352 for specific guidance in choosing cables and installing cables onboard a ship. Within these guidelines, Sea Tel will provide some very general information regarding the electrical installation.

In general, all cable shall be protected from chaffing and secured to a cableway. Cable runs on open deck or down a mast shall be in metal conduit suitable for marine use. The conduit shall be blown through with dry air prior to passing cable to ensure all debris has been cleared out of the conduit and again after passing the cable to ensure no trapped moisture exists. The ends of the conduit shall be sealed with cable glands (preferred), mastic or low VOC silicon sealant after the cables have been passed through.

Cables passing through bulkheads or decks shall be routed through approved weather tight glands.

2.8.1. ADE/BDE Coaxial Cables

The first concern with the coaxial cables installed between the ADE & BDE is length. This length is used to determine the loss of the various possible coax, Heliac or fiber-optic cables that might be used. You should always provide the lowest loss cables to provide the strongest signal level into the satellite modem.

Signal cable shall be continuous from the connection within the ADE radome, through the structure of the ship to the BDE. Splices, adapters or dummy connections will degrade the signal level and are discouraged.

Be careful of sharp bends that kink and damage the cable. Use a proper tubing bender for Heliac bends.

Penetrations in watertight bulkheads are very expensive, single cable, welded penetrations that must be pressure tested.

Always use good quality connectors that are designed to fit properly on the cables you are using. Poor quality connectors have higher loss, can allow noise into the cable, are easily damaged or fail prematurely.

In as much as is possible, don't lay the coaxes on power cables. Try to have some separation from Inmarsat & GPS cables that are also passing L-band frequencies or radar cables that may inject pulse repetition noise –as error bits - into your cables.

2.8.2. Antenna Power Cable

Be cautious of length of the run, for voltage loss issues, and assure that the gauge of the wires is adequate for the current that is expected to be drawn (plus margin). Antenna power is recommended (but not required) to be from a UPS, generally the same one that supplies power to the below decks equipment.

Power cables shall comply with the provisions of IEC 60092-350 and -351 as practical. Power cables may be routed through the same conduit as the signal cable from the junction box to the base of the ADE. Power cables shall pass through separate radome penetrations from the signal cable.

The power cable shall be continuous from the UPS (or closest circuit breaker) to the ADE connections within the radome. The power circuits shall be arranged so that 'active,' 'common' and 'neutral' (ground) legs are all made or broken simultaneously. All circuit legs shall be carried in the same cable jacket.

2.8.3. Air Conditioner Power Cable

If your system includes a marine air conditioner (available with the 81 inch radome ONLY), run an AC power cable to it from a breaker, preferably from a different phase of the electrical system than supplies power to the ADE & BDE. Be EXTREMELY cautious of length of the run for voltage loss and gauge of the wires for the current that is expected to be drawn.

Power cable shall comply with the provisions of IEC 60092-350 and -351 in so far as practical. Power cables may be routed through the same conduit as the signal cable from the junction box to the base of the ADE. Power cables shall pass through separate radome penetrations from the signal cable.

The power cable shall be continuous from the closest circuit breaker to the ADE connections within the radome. The power circuits shall be arranged so that 'active,' 'common' and 'neutral' (ground) legs are all made or broken simultaneously. All circuit legs shall be carried in the same cable jacket.

2.8.4. ACU Power Cable/Outlet

The AC power for the ACU and the ADE is not required to be from a UPS (same one that supplies power to the ADE), but it is recommended.

Power cable shall comply with the provisions of IEC 60092-350 and -351 in so far as practicable.

2.8.5. Gyro Compass Cable

Use good quality shielded cables (twisted pairs, individually foil wrapped, outer foil with braid overall is best). You only need 2-wire for NMEA signal, 4-wire for Step-By-Step and 5-wire for Synchro ... always use shielded cable. Be cautious of length and gauge of the run for voltage loss issues.

2.9. *Grounding*

All metal parts of the ADE shall be grounded to bare metal that is common to the hull of the ship. This is most commonly accomplished by attaching a ground wire/cable from the upper base plate ground point to a ground stud on the mounting pedestal/stanchion/mast near the base of the radome. Preservation of the bare metal contact point should be done to prevent loss of ground due to rust and/or corrosion.

Grounding by exposing bare metal under all mounting bolts of the under-side of the radome base prior to final tightening does NOT provide adequate grounding of the ADE.

Grounding should be ensured throughout the entire mounting to the hull. While it is presumed the deckhouse is permanently bonded and grounded to the hull, in cases where the deckhouse and hull are of different materials a check of an independent ground bonding strap should be made. Masts should be confirmed to be grounded to the deckhouse or hull.

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3. Installation

Your antenna pedestal comes completely assembled in its radome. This section contains instructions for unpacking, final assembling and installing of the equipment. It is highly recommended that trained technicians install the system.

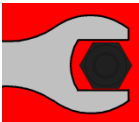
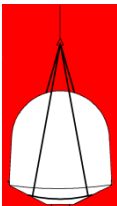
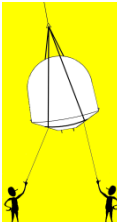
The installation instructions for your system are below.

3.1. Unpacking and Inspection

Exercise caution when unpacking the equipment.

1. Unpack the crates. Carefully inspect the radome surface for evidence of shipping damage.
2. Unpack all the boxes.
3. Inspect everything to assure that all materials have been received and are in good condition.

3.2. Assembly Notes and Warnings

	NOTE: All nuts and bolts should be assembled using the appropriate Loctite thread-locker product number for the thread size of the hardware.																				
	<table><tr><th>Loctite #</th><th>Description</th></tr><tr><td>222</td><td>Low strength for small fasteners.</td></tr><tr><td>242</td><td>Medium strength</td></tr><tr><td>638</td><td>High strength for motor shafts & sprockets.</td></tr><tr><td>2760</td><td>Permanent strength for up to 1" diameter fasteners.</td></tr><tr><td>290</td><td>Wicking, High strength for fasteners which are already assembled.</td></tr></table>	Loctite #	Description	222	Low strength for small fasteners.	242	Medium strength	638	High strength for motor shafts & sprockets.	2760	Permanent strength for up to 1" diameter fasteners.	290	Wicking, High strength for fasteners which are already assembled.								
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	WARNING: Assure that all nut and bolt assemblies are tightened according to the tightening torque values listed below: <table><tr><th>SAE Bolt Size</th><th>Inch Pounds</th><th>Metric Bolt Size</th><th>Kg-cm</th></tr><tr><td>1/4-20</td><td>75</td><td>M6</td><td>75.3</td></tr><tr><td>5/16-18</td><td>132</td><td>M8</td><td>150</td></tr><tr><td>3/8-16</td><td>236</td><td>M10</td><td>270</td></tr><tr><td>1/2-13</td><td>517</td><td>M12</td><td>430</td></tr></table>	SAE Bolt Size	Inch Pounds	Metric Bolt Size	Kg-cm	1/4-20	75	M6	75.3	5/16-18	132	M8	150	3/8-16	236	M10	270	1/2-13	517	M12	430
SAE Bolt Size	Inch Pounds	Metric Bolt Size	Kg-cm																		
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3/8-16	236	M10	270																		
1/2-13	517	M12	430																		
	WARNING: Hoisting with other than a webbed four-part sling may result in catastrophic crushing of the radome. Refer to the specifications and drawings for the fully assembled weight of your model antenna/radome and assure that equipment used to lift/hoist this system is rated accordingly.																				
	CAUTION: The antenna/radome assembly is very light for its size and is subject to large swaying motions if hoisted under windy conditions. Always ensure that tag lines, attached to the radome base frame, are attended while hoisting the antenna assembly to its assigned location aboard ship.																				

3.3. Installing the ADE

The antenna pedestal is shipped completely assembled in its radome. Please refer to the entire Site Survey chapter of this manual.

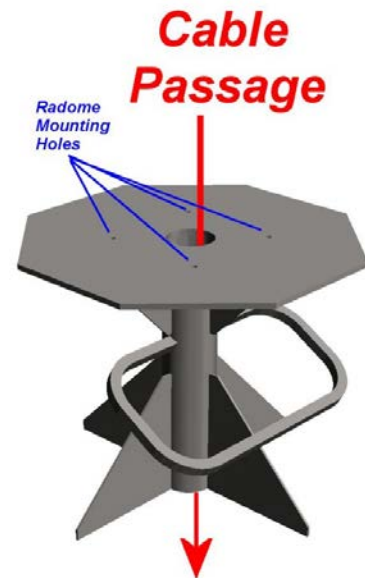
Base Hatch Access - Mounting the radome directly on the deck or platform prevents access to the hatch in the base of the radome unless an opening is designed into the mounting surface to allow such entry. If there is no access to the hatch the only way to service the antenna is to remove the radome top. Two people are required to take the top off of the radome without cracking or losing control of it, but even with two people a gust of wind may cause them to lose control and the radome top may be catastrophically damaged (see repair information in the radome specifications) or lost.

If access to the hatch cannot be provided in the mounting surface, provide a short ADE mounting stanchion to mount the ADE on which is tall enough to allow access into the radome via the hatch.

Ladder rungs must be provided on all mounting stanchions greater than 3-4 feet tall to allow footing for personnel safety when entering the hatch of the radome.

Cable Passage - The radome base is designed with a bottom center cable passage and Roxtec® Multidiameter® blocks for cable strain relief. The recommended cable passage in the 50, 60, 61 and 66 inch radomes is through the bottom center of the radome base, down through the ADE mounting stanchion, through the deck and into the interior of the ship.

Bottom center cable passage is recommended, however, a strain relief kit is provided with the system if off-center cable entry is required. **Note: Strain relief installation procedure, provided in the Drawings chapter, MUST be followed to assure that the cored holes are properly sealed to prevent moisture absorption and delamination of the radome base.**

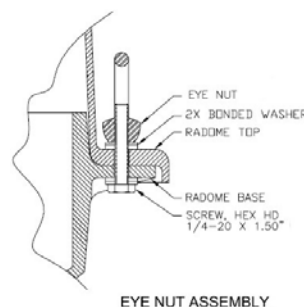


3.3.1. Prepare the 40", 50", 60", 66" or 76" Radome Assembly

1. Remove the side walls of the radome crate.
2. Lift the pallet using a forklift and/or jacks.
3. From the underside of the pallet, remove the four shipping bolts which attach the ADE to its' pallet. Discard this shipping hardware.



4. Remove four equally spaced bolts around the radome flange. Save these nuts and bolts to be reinstalled later.
5. Install four lifting eyebolts in the vacant holes in the flange of the radome.. (Hardware provided in the radome installation kit). Keep the original perimeter bolt hardware to be reinstalled after the ADE has been installed.



6. Attach shackles and four part web lifting sling arrangement to the eyebolts.
7. Attach a suitable length tagline to one of the eyebolts.
8. After hoisted into place the lifting eyes are to be removed and replaced with the stainless hardware that was removed in step 4 (the eyes are galvanized with bare thread that will rust if left exposed to the weather).



3.3.2. Install 76" Radome to mounting deck.

The antenna pedestal is shipped completely assembled, restrained for shipping, in its radome.

1. Man the tag line(s).
2. Remove four equally spaced bolts around the radome flange. Save these nuts and bolts to be re-installed later.
3. Install four lifting eyebolts in the vacant holes in the flange of the radome. (Hardware provided in the radome installation kit). Keep the original perimeter bolt hardware to be reinstalled after the ADE has been installed.
4. Attach shackles and four part web lifting sling arrangement to the eyebolts.
5. Attach a suitable length tagline to one of the eyebolts.
6. Hoist the antenna assembly off the shipping pallet, by means of a suitably sized crane or derrick, to allow access to bottom of radome assembly.
7. Open the hatch by pressing the round release button in the center of the black latches and gently push the hatch up into the radome. Place the hatch door (gel coat surface up) inside the radome on the far side of the antenna pedestal.
8. Inspect the pedestal assembly and reflector for signs of shipping damage.
9. Peel the paper off of the mounting pad (provided in the radome installation kit) to expose the sticky side of the pad, align it to the mounting holes and press it in place on the underside of the radome base.
10. Using Loctite 271, install the twelve mounting bolts (provided in 123549-2 mounting kit) into the radome base. **ALL twelve mounting holes must be used when securing above decks equipment to vessel.**
11. Hoist the antenna assembly up onto the ship and hover above the mounting site on the ship.
12. Route AC power, ground strap/cable (see Grounding info below) and IF coax cables through the cable passage in center of the bottom of the radome base and through the cable channel under the lower base plate of antenna. Allow enough service loop to terminate these cables to the circuit breaker assembly and connector bracket respectively (see cable termination information below).
13. Lower radome assembly into the mounting holes, positioned with the BOW reference of the radome parallel with centerline of the ship. Any variation from actual alignment can be compensated with the Home Flag Offset and AZIMUTH TRIM adjustment, so precise alignment is not required.
14. Using Loctite 271, install the twelve fender washers and hex nuts (provided in mounting kit) from the underside of the mounting surface.
15. Remove the tag lines.
16. Remove the lifting sling.
17. Remove the four lifting eye nuts and reinstall the original perimeter bolt hardware (the eyes are galvanized with bare thread that will rust if left exposed to the weather). Save the lifting eye hardware in case lifting of the ADE is required in the future.

3.3.3. **Preparing and Installing the Single Piece 81" Radome Assembly**

The antenna pedestal is shipped completely assembled in its 81" single piece radome.

1. Remove the shipping hold-down bolts which mount the ADE to its' pallet.
2. Install four lifting eye bolts, provided in the radome installation kit, in holes around the perimeter of the baseframe.
3. Attach a four-part lifting sling to the four lifting eyes in the base of the radome and lift the radome assembly free of its shipping pallet. Place the radome assembly on temporary support blocks at least 22 inches high.
4. Loosely assemble the radome base frame's eight legs and eleven braces as shown in the Radome Base Frame Assembly drawing using the hardware provided. Insure that a split washer is used under each nut. When assembled, apply Loctite and tighten all hardware.
5. Using the four-part lifting sling, and with a tag line attached to the radome base frame, hoist the antenna assembly to its assigned location aboard ship by means of a suitably-sized crane or derrick.
6. The radome assembly should be positioned with the BOW marker aligned as close as possible to the ship centerline. Any variation from actual alignment can be compensated with the Home Flag Offset and AZIMUTH TRIM adjustment, so precise alignment is not required.
7. Bolt or weld the legs of the radome base frame directly to the ship's deck or suitable mounting surface. If the deck is uneven or not level, weld clips to the deck and attach them to the legs of the radome base frame. When completed the radome should be as near to level as is practical.
8. Disconnect the lifting sling from the four lifting eyes in the base of the radome.
9. Remove the four lifting eye bolts. Save the lifting eye hardware in case lifting of the ADE is required in the future.
10. Route AC Power and IF coax cables through the strain reliefs installed in the basepan of the radome. Allow enough service loop to terminate these cables to the circuit breaker assembly and connector bracket respectively (see cable termination information below).



3.4. **Grounding the Pedestal**

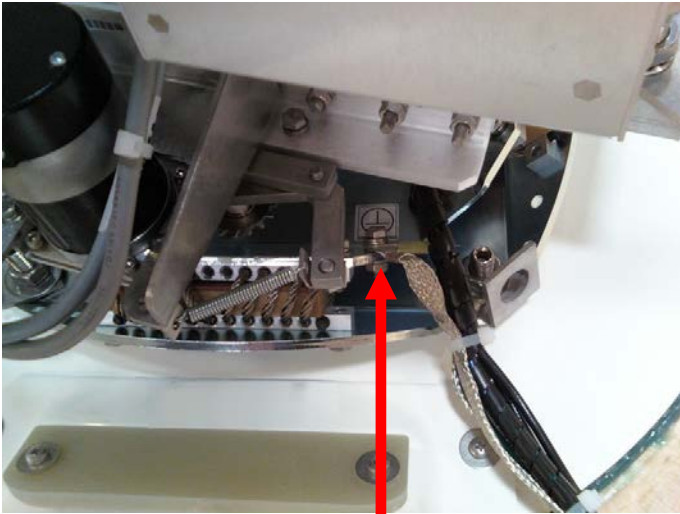
The antenna pedestal must be grounded to the hull of the ship. A grounding point is provided on the upper base plate to ground the pedestal. A ground wire, of appropriate gauge for it's length, must be provided to ground the pedestal to the mounting platform that it will be bolted to (this is usually on or near the mounting surface). This mounting must also be electrically common with the hull of the vessel.

If a longer ground connection is required to reach a common metal connection to the hull, you must provide that longer cable/strap that is of sufficient gauge and length to ground the pedestal to the nearest grounding point of the hull.

Solid strap is the conductor of choice for low impedance RF ground connections because the RF currents tend to flow along the outer surface and the strap has a large smooth surface area to take full advantage of this effect.

Braid is the conductor of choice where flexibility is required. Sea Tel uses braid to cross axes of the antenna pedestal and to connect various subassemblies together.

Wire is the easiest to install and connect and is readily available with a weather protective jacket. 4 awg and 6 awg bare solid copper wire is commonly used as safety grounds and very basic lightning protection grounds. 2 awg stranded wire is often used for lightning grounding and bonding and it much more flexible.

1. Connect the ground wire (of adequate gauge for the length) to a burnished ground point on, or near, the mounting surface. This burnished grounding point must be electrically common with the hull. Bi-metal coupling plate may be required to get good electrical coupling to the hull of the ship. Protective coating should be applied to prevent the grounding point, and ground wire, from rusting or corroding. NOTE: Minimum gauge should not be smaller than 10 AWG, even for a short cable run. 2. Route the ground cable/strap up through the radome base with the coax and power cables. 3. Route the ground strap/cable through one of the Roxtec® Multidiameter® blocks with the other power and coax cables. 4. Connect the grounding strap/cable to the burnished ground point on the upper base plate.	
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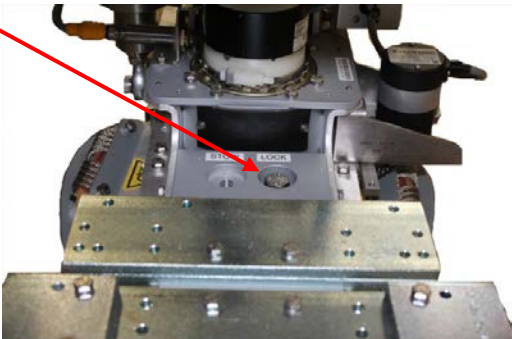
3.5. Removing the Shipping/Stow Restraints *PRIOR* to Power-Up

The order the restraints are removed is not critical.

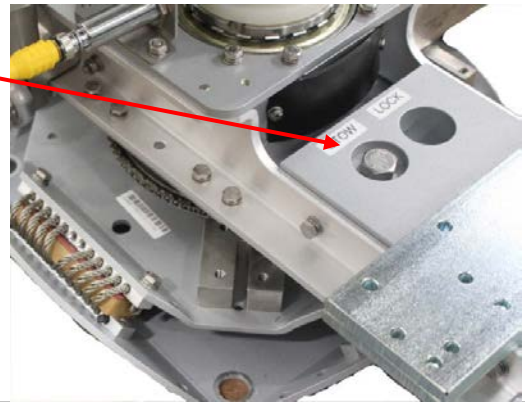


CAUTION: There are three shipping/stow restraints on this antenna pedestal that **MUST** be removed, **before energizing** the antenna, for normal operation.

3.5.1. Removing the AZ Shipping/Stow Restraint

1. The AZ shipping/stow restraint is formed by a pin bolt that is lowered into a channel in a stowage block on the upper plate of the pedestal (as shown).	
2. To un-stow the antenna, remove the pin bolt from the LOCK position.	

3. Install the pin bolt into the STOW hole and tighten. This assures that it does not get lost and will be ready for re-use if the antenna needs to be stowed again at a later date.
4. Verify that the antenna is able to rotate freely in azimuth.



3.5.2. Removing the EL Shipping/Stow Restraint

1. The EL shipping/stow restraint is formed by a stow pin-bolt mounted through a bracket and is engaged into a hole/slot in the elevation driven sprocket when the dish is at zenith (90 degrees elevation).
2. In the stowed position, the hardware from left to right is stow pin-bolt head, washer, bracket, washer, hex nut, hex nut so that the pin section of the stow pin-bolt is inserted into the hole in the elevation driven sprocket.

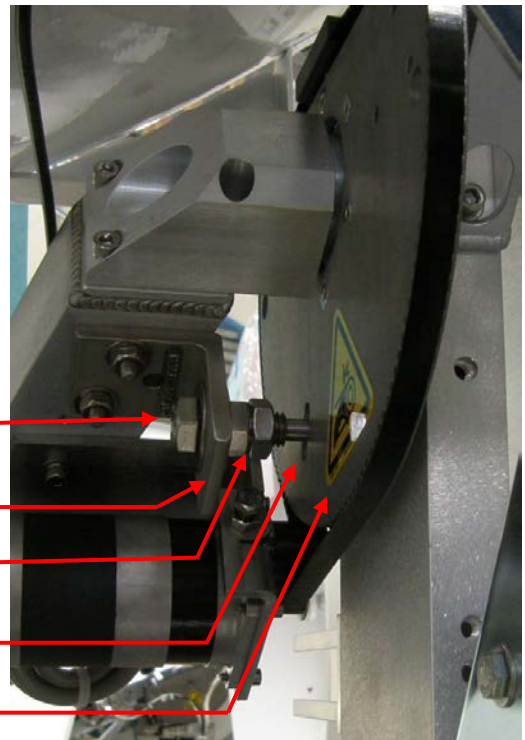
EL Stow Pin-Bolt head

Bracket

2 Hex Nuts

Pin inserted into Elevation Driven Sprocket

Elevation Driven Sprocket



3. To un-restrain the elevation axis of the antenna, unthread the two hex nuts. Using a $\frac{3}{4}$ " open end wrench, remove the hex nuts and washer from the stow pin-bolt.
4. Remove the stow pin-bolt from the bracket.



5. Remove the washer from the stow pin-bolt and thread one of the two hex nuts onto the bolt and tighten.
6. Put one of the washers onto the stow pin-bolt and insert it into the bracket toward the elevation driven sprocket.
7. Put the other washer, and then the other hex nut onto the bolt.



8. Tighten the hex nut to prevent the hardware from loosening while in the un-stowed configuration.
9. Verify that the antenna rotates freely through its full elevation range of motion.



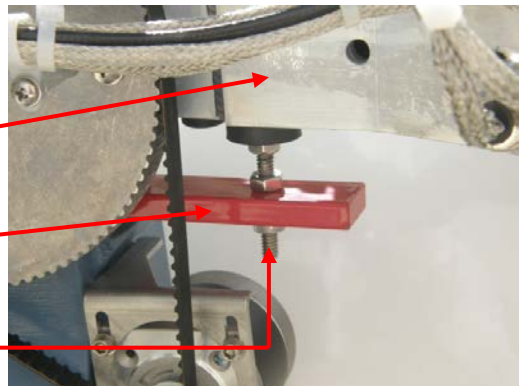
3.5.3. Removing the CL Shipping/Stow Restraint

1. The CL shipping/stow restraint is formed by a red locking bar with adjustable bumpers at each end of the bar. This mechanism is placed under the cross-level beam to lock it in place.

Cross-Level Beam

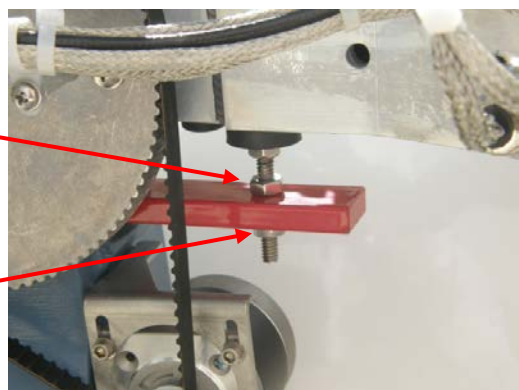
CL Shipping/Stow bar

Adjustable CL Locking Bumpers (only one end shown)



2. To un-restrain the cross-level axis of the antenna use a 7/16" open end wrench to loosen the nut on the top side of the locking bar (either end of the bar).

3. Remove the bottom nut off of that adjustable bumper.
4. Remove the adjustable bumper from the locking bar.



5. Extract the locking bar from the underside of the cross-level beam and retain these parts for later re-use if it becomes necessary to stow the antenna.
6. Verify that the antenna rotates (tilts left and right from level) freely through its full cross-level range of motion.

3.6. Installing the Below Decks Equipment.

3.6.1. General Cautions & Warnings



CAUTION - Electrical Shock Potentials exist on the Gyro Compass output lines. Assure that the Gyro Compass output is turned **OFF** when handling and connecting wiring to the MXP.



CAUTION - Allow only an authorized dealer to install or service the Sea Tel System components. Unauthorized installation or service can be dangerous and may invalidate the warranty.

3.7. Connecting the Below Decks Equipment

Connect this equipment as shown in the System Block Diagram. Install the equipment in a standard 19 inch equipment rack or other suitable location. Optional slide rails are available.

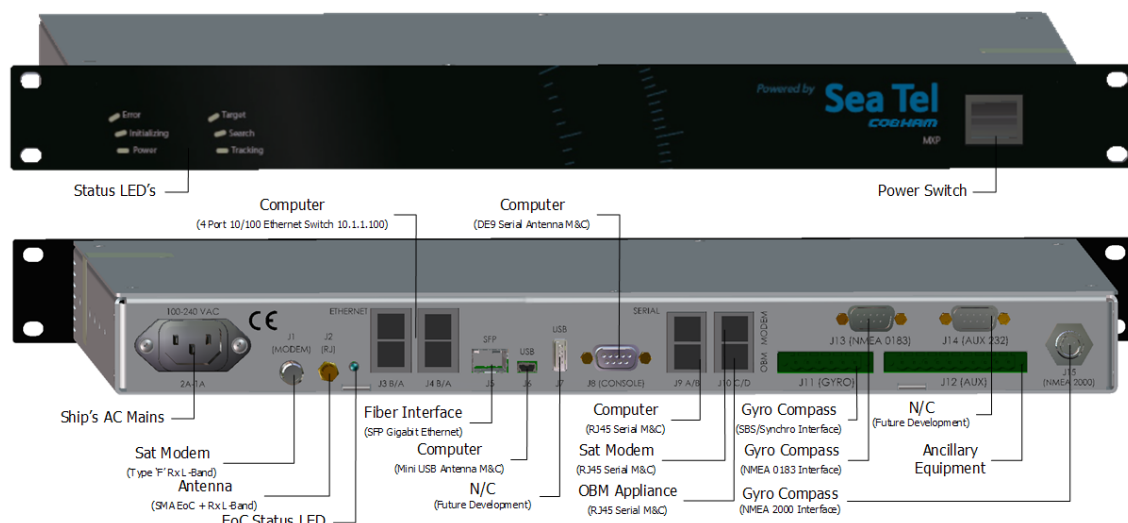
3.7.1. Connecting the ADE AC Power Cable

Connect the AC Power cable that supplies power to the ADE to a suitably rated breaker or UPS.

3.7.2. Connecting the BDE AC Power Cables

Connect the AC Power cables that supply power to the Below Decks Equipment (MXP, Satellite Modem, phone, fax, computer and all other equipment) to an outlet strip fed from a suitably rated breaker or UPS.

3.7.3. Media Xchange Point™ (MXP) Connections



3.7.3.1. Ships AC Mains

Connect the power cord from the rear panel of the MXP to AC voltage power source (UPS power recommended).

3.7.3.2. J1 Modem RX

Connect this RXIF Output to the satellite modem RX Input using an appropriate coaxial cable.

3.7.3.3. J2 Antenna RX

Connect this RXIF Input from the antenna to this port on the rear panel of the MXP using coaxial cable provided

3.7.3.4. J3 A/B & J4 A/B - Ethernet 4 Port 10/100 switch

Ethernet connections to computer, satellite modem LAN devices as desired.

3.7.3.5. J5 SFP Fiber Interface

SFP Gigabit Ethernet connection.

3.7.3.6. J6 Mini-USB Computer M&C Connection

Mini-USB Antenna M&C connection, if desired.

3.7.3.7. J7 USB Host

Not connected - -Future development.

3.7.3.8. J8 Console

Antenna M&C Serial connections.

3.7.3.9. J9 A/B Serial

Computer RJ-45 Serial M&C connections. A is mapped to the Radio serial M&C port of the ICU and B is mapped to the Pass through serial M&C port of the ICU.

3.7.3.10. J10C Modem

RJ-45 Serial M&C connection to Satellite Modem Console Port.

3.7.3.11. J10D OBM

RJ-45 Serial M&C connection to Out of Band Management equipment, if used.

3.7.3.12. J11 Gyro

Terminal Strip for SBS or Synchro Gyro Compass interface connections. Wiring is:

Pin 1	Synchro R1
Pin 2	Synchro R2
Pin 3	Synchro S1 / SBS A
Pin 4	Synchro S2 / SBS B
Pin 5	Synchro S3 / SBS C
Pin 6	SBS COM

3.7.3.1. J13 NMEA 0183

NMEA 0183 I/O connections. Wiring is:

Pin 1	RX+
Pin 2	RX-
Pin 3	TX-
Pin 4	N/C
Pin 5	GND
Pin 6	N/C
Pin 7	GND
Pin 8	TX+
Pin 9	+12 VDC

3.7.3.2. J12 Aux 232

Auxiliary wired RS-232 connection. Wiring is:

Pin 1 - GND	Ground
Pin 2 - Aux IN1	Modem Lock Input 1 - See modem setup chapter.
Pin 3 - Aux IN2	Modem Lock Input 2 - See modem setup chapter.
Pin 4 - GND	Ground
Pin 5 - SW1	Blockage/Modem Mute Output 1 - See blockage & modem setup chapters.
Pin 6 - SW2	Blockage/Modem Mute Output 2 - See blockage & modem setup chapters.
Pin 7 - SW3A	Dry Contact set 1 - Dry alarm contacts used to provide (programmable) alarm output to other equipment/systems. Switched outputs have ability to use 4.7K pull up or Pull Down and can provide Current sink of 0.5 amps max. Contacts are Normally Open for No Alarm state and are Closed/Shorted when the programmed alarm state exists.
Pin 8 - SW3B	
Pin 9 - SW4A	Dry Contact set 2 - Same as dry alarm contact set 1.
Pin 10 - SW4B	

3.7.3.3. J14 Aux 232

Wiring is:

Pin 1	N/C
Pin 2	RX
Pin 3	TX
Pin 4	N/C
Pin 5	GND
Pin 6	N/C
Pin 7	GND
Pin 8	N/C
Pin 9	+12 VDC

3.7.3.4. J15 NMEA 2000

NMEA 2000 I/O connection. **RESERVED FOR FUTURE USE**

3.7.4. Other BDE connections

Connect your other Below Decks Equipment (ie, telephone, fax machine and computer equipment) to complete your configuration.

3.8. Final Checks

3.8.1. Visual/Electrical inspection

Do a visual inspection of your work to assure that everything is connected properly and all cables/wires are secured.

3.8.2. Electrical - Double check wiring connections

Double check all your connections to assure that it is safe to energize the equipment.

3.9. Setup - Media Xchange Point™ (MXP)

Now that you have installed the hardware, you will need to setup, calibrate and commission the antenna.

You may also need to load/update the modem option file, which is not part of the scope of this manual, contact the airtime provider NOC for guidance.

At the very least, you will need to set up the antenna system for:

- Connect & configure a ships computer for accessing the MXP.
- The gyro compass signal being provided by the ship.
- The tracking receiver frequency settings for the satellite to be used (configure satellites).
- Set up / configure all satellites that the system might use as the ship travels.
- Check/Set Home Flag Offset.
- Set up Blockage zone(s) as needed.
- Acquire the desired satellite.
- Optimize targeting (Auto or manual trim).
- Arrange for commissioning & cross-pol isolation testing with the NOC.
- Conduct cross-pol isolation testing with the NOC.
- Conduct other commissioning testing with the NOC (ie P1dB compression point).
- If this is a Dual Antenna installation configuration, you will have to balance the TX levels of the two antennas while online with the NOC (refer to procedure in the Dual Antenna Arbitrator manual).
- It is strongly recommended that you download, and save, the system INI file (contains all of the system parameters). Save this file in a convenient location.

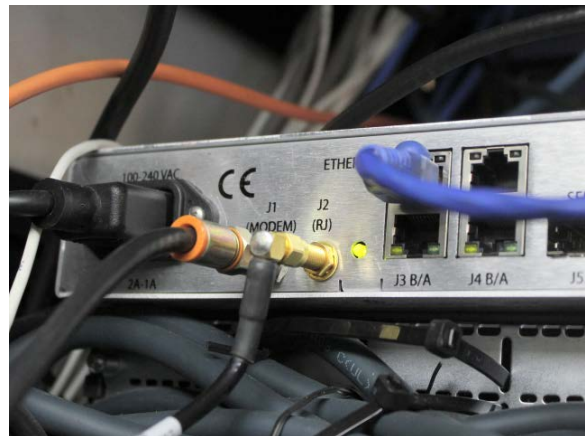
4. Configuring a Computer for the MXP

The first thing you need to do is to configure your computer so that it will display the MXP screens. Follow these instructions to accomplish that.

1. Connect a LAN cable to the back of your computer. If you are connecting into a LAN, instead of a single computer, you will need to provide a connection from your LAN router/hub/switch to the MXP.



2. Connect the other end of the LAN cable to the back of the MXP.

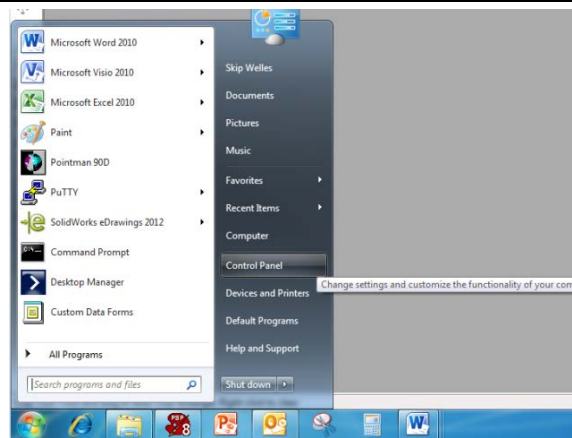


3. Power on the MXP.

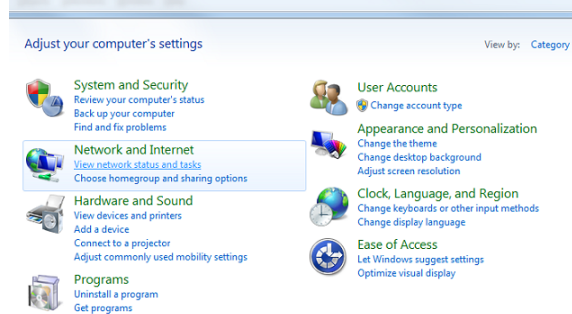


4. From your computer desktop, click the Control Panel button.

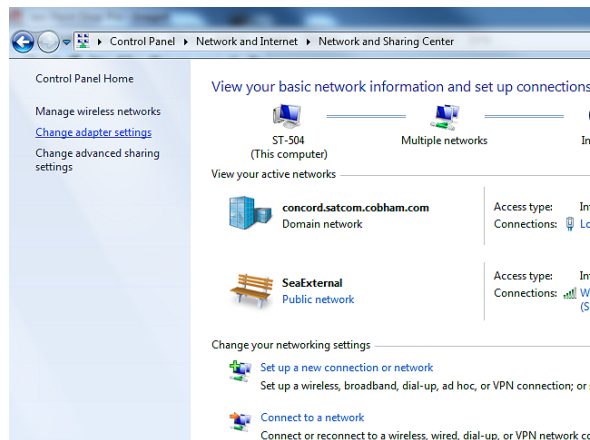
NOTE: The following displayed screen captures are from Windows 7 OS. Your screens may differ, refer to your PC manual for changing network adapter settings.



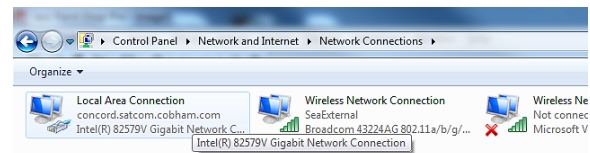
5. Click on "View network status and tasks".

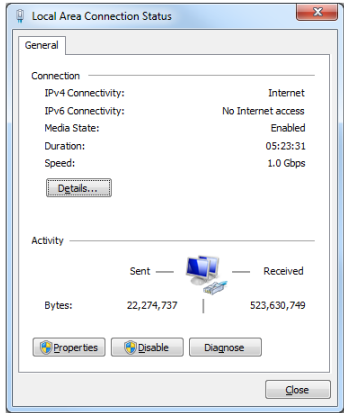
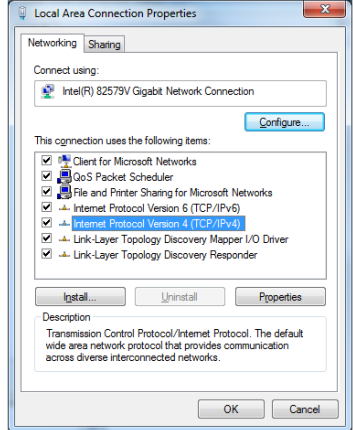
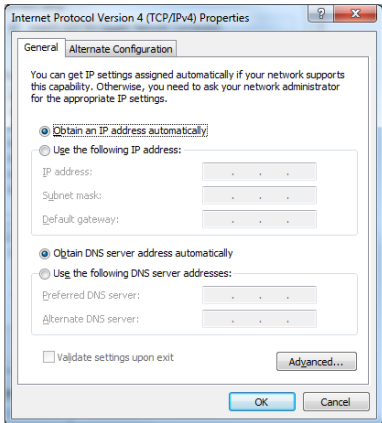


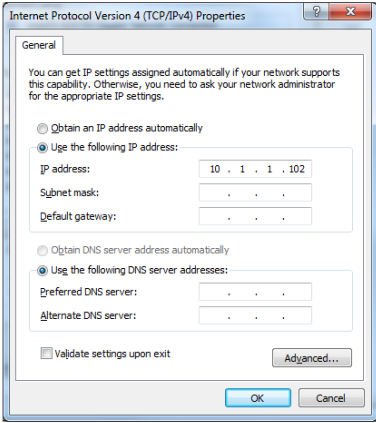
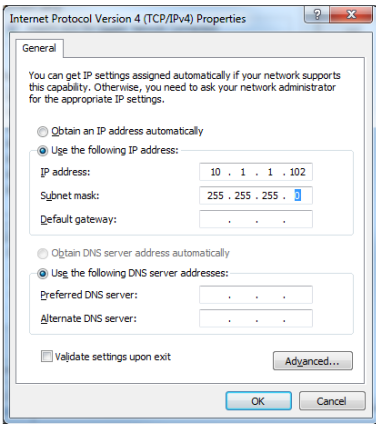
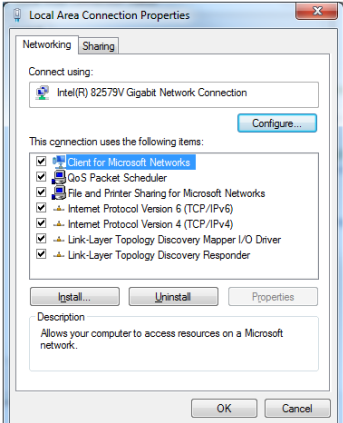
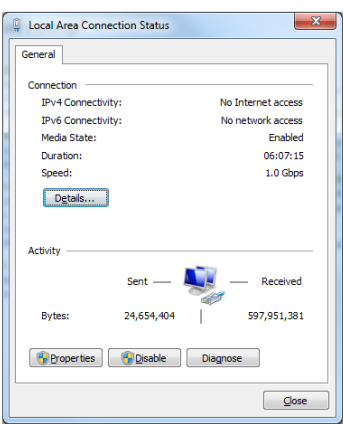
6. Click "Change adapter settings".

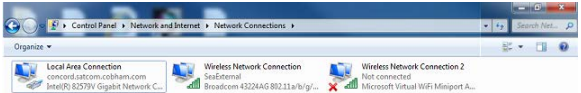
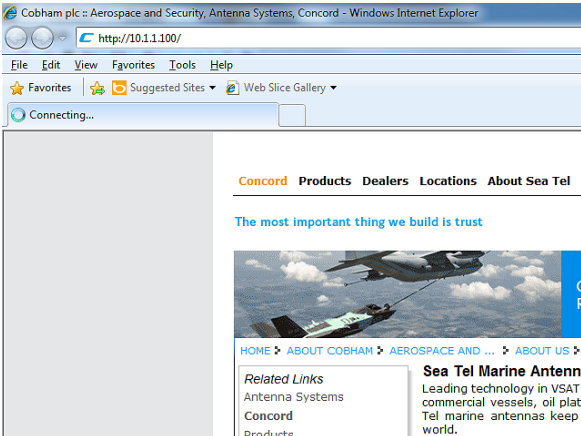
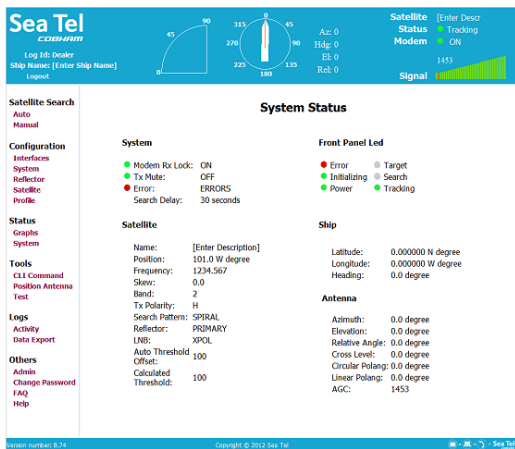


7. Click on "Local Area Connection."



8. Click on “Properties”.	
9. Double-Click on “Internet Protocol Version 4 (IPv4)”.	
10. Click on “Use the following IP address:	

11. In the IP Address boxes, enter “10.1.1.102” (This is for the IP address of your computer). NOTE: You could use 101, 102, 103, etc. as long as it is not the same as the address of the MXP, which is “10.1.1.100” (default).	
12. On the second line, enter Subnet Mask of “255.255.255.0”. 13. Then click the “OK” button.	
14. Back at the Local Area Connection Properties screen, click the “OK” button.	
15. Click the “Close” button.	

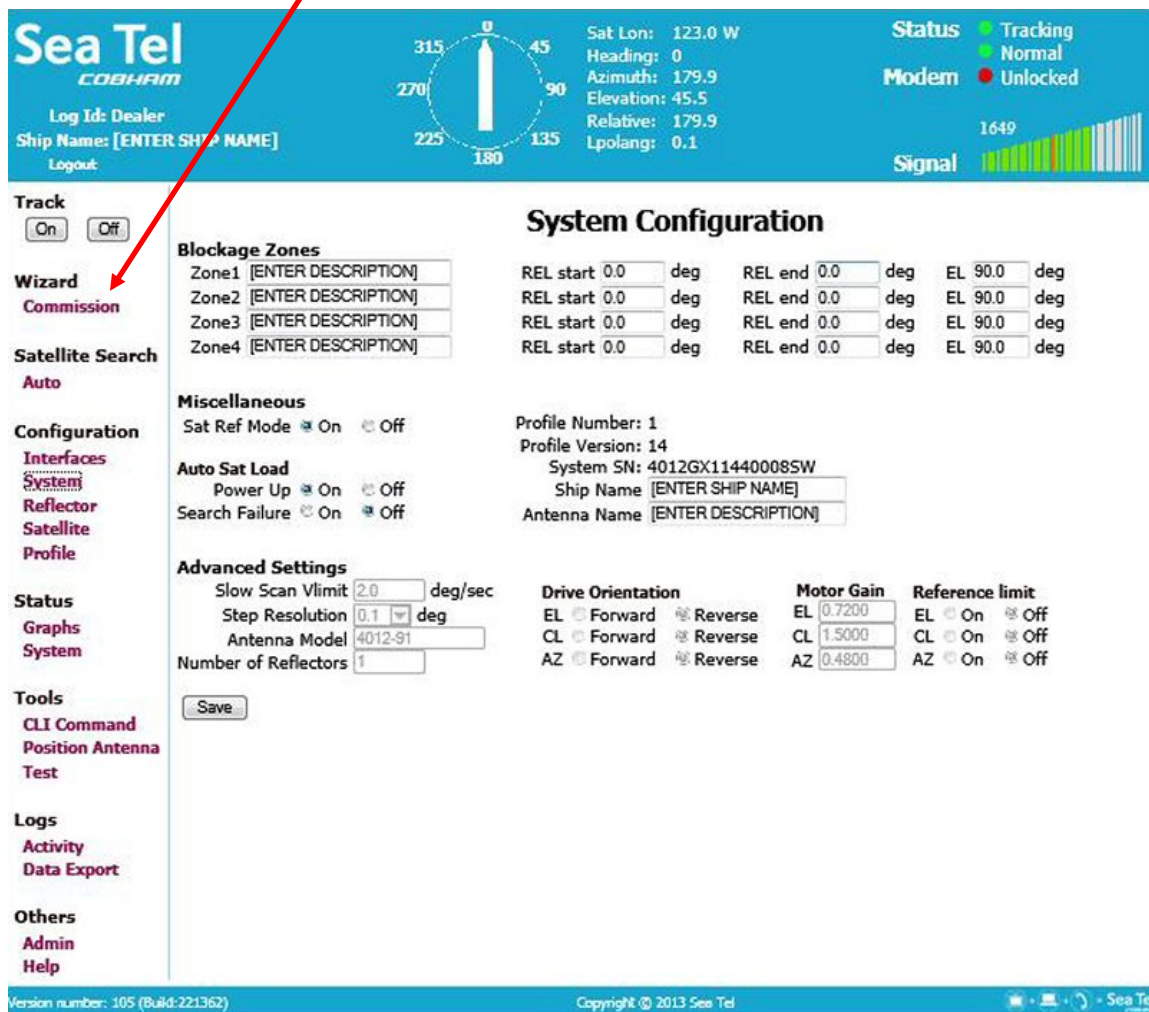
16. Close the Control Panel.	
17. Open your browser, and enter the URL: "10.1.1.100".	
18. At the log in screen enter the user name (Dealer, SysAdmin, or User). Contact Sea Tel Service for the password.	
19. After you log in you will see the System Status screen	

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5. Setup – Using the Commission Wizard

5.1. Starting the Commission Wizard

When the system is powered up for the first time (or whenever desired) the Commission Wizard can be run to set the system up for use on this ship, with this gyrocompass and this modem. To begin, log in as dealer, and select Wizard – Commission from the left side of the page:



Sea Tel COBHAM

Log Id: Dealer
Ship Name: [ENTER SHIP NAME]
Logout

Sat Lon: 123.0 W
Heading: 0
Azimuth: 179.9
Elevation: 45.5
Relative: 179.9
Lpolang: 0.1

Status: ● Tracking
● Normal
Modem: ● Unlocked

Signal: 1649

Track
☐ On ☐ Off

Wizard
Commission

Satellite Search
Auto

Configuration
Interfaces
System
Reflector
Satellite
Profile

Status
Graphs
System

Tools
CLI Command
Position Antenna
Test

Logs
Activity
Data Export

Others
Admin
Help

System Configuration

Blockage Zones

Zone	REL start	deg	REL end	deg	EL	deg
Zone1 [ENTER DESCRIPTION]	0.0	deg	0.0	deg	90.0	deg
Zone2 [ENTER DESCRIPTION]	0.0	deg	0.0	deg	90.0	deg
Zone3 [ENTER DESCRIPTION]	0.0	deg	0.0	deg	90.0	deg
Zone4 [ENTER DESCRIPTION]	0.0	deg	0.0	deg	90.0	deg

Miscellaneous

Sat Ref Mode ☒ On ☐ Off

Auto Sat Load

Power Up ☒ On ☐ Off
Search Failure ☐ On ☒ Off

Advanced Settings

Slow Scan Vlimit: 2.0 deg/sec
Step Resolution: 0.1 deg
Antenna Model: 4012-91
Number of Reflectors: 1

Drive Orientation

Drive	Forward	Reverse
EL	☒ Forward	☐ Reverse
CL	☒ Forward	☐ Reverse
AZ	☒ Forward	☐ Reverse

Motor Gain

Motor	Gain
EL	0.7200
CL	1.5000
AZ	0.4800

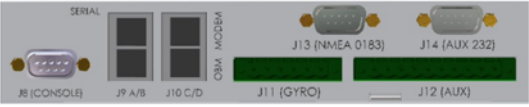
Reference limit

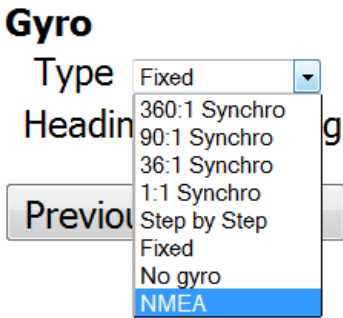
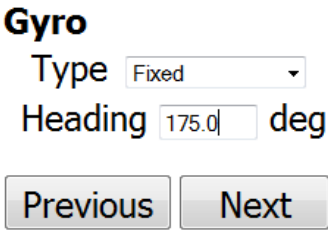
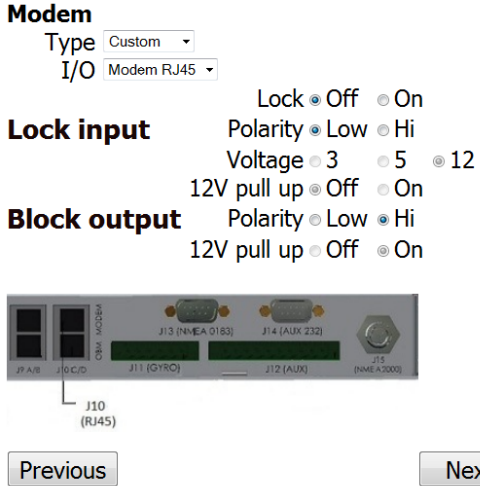
Reference	Limit
EL	☒ On ☐ Off
CL	☒ On ☐ Off
AZ	☒ On ☐ Off

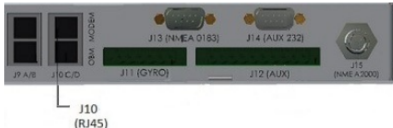
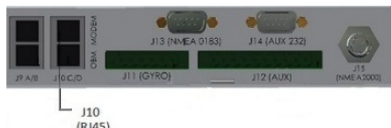
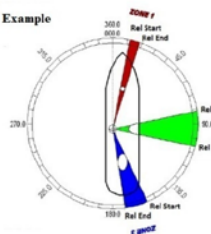
Version number: 105 (Build: 221362) Copyright © 2013 Sea Tel

5.2. Commissioning Wizard

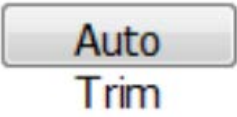
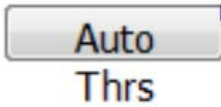
After selection of the commissioning wizard, you will follow the procedure below to fill in the information. Also refer to following setup chapters for more information on specific entries in this wizard.

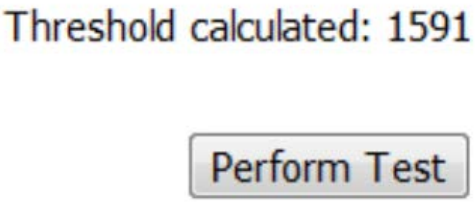
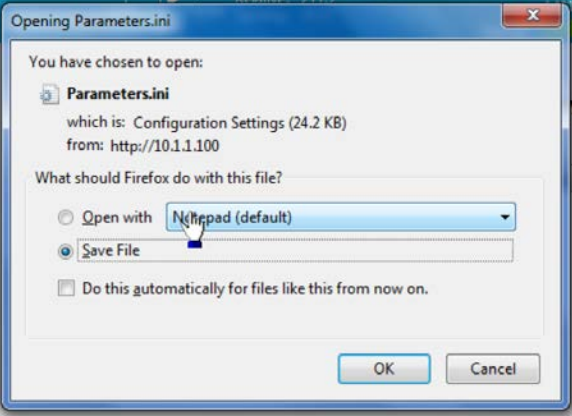
1. On the welcoming page, click on “Start”.	Welcome to Commissioning Wizard Start
In the Network Configuration section, you will configure the MXP's Network information. 2. Enter in the desired IP address, Subnet Mask and Gateway for the MXP's four port unmanaged switch (J3 A/B & J4 A/B). Note: Although any class IP address may be used, ABS based installations must set these values to be on the same subnet mask as the interfaced satellite modem. 3. Click on “Next”.	Network IP Address 10.1.1.100 Subnet Mask 255.255.255.0 Gateway 10.181.150.1 Note: new IP will be in effect only after system reboot Next
The MXP Serial Port section allows you to configure the MXP's bps settings for serial based communications with various 3rd party devices (i.e. laptop, Out of Band Management devices, etc).	MXP Serial Port Aux 232 9600 - bps (on J14) Console 19200 - bps (RS232 on J8 for CLI commands) NMEA 0183 4800 - bps (on J13 for NMEA 0183 sentences) OBM/Modem 4800 - bps (on J10 for NMEA to Modem and OBM connections)  Previous Next
4. Select the applicable baud rate using the drop down menu selections list for the port in which you are defining. 5. Click on “Next”.	MXP Serial Port Aux 232 9600 - bps (on J14) Console 19200 - bps (RS232 on J8 for CLI commands) NMEA 0183 4800 - bps (on J13 for NMEA 0183 sentences) OBM/Modem 4800 - bps (on J10 for NMEA to Modem and OBM connections)  Previous Next
The Gyro section allows you to define that type of Gyro Compass (if any) integrated with the MXP. For more information, refer to the Setup – Ship's Gyro Compass chapter.	Gyro Type Fixed Heading 0.0 deg Previous Next

6. Using the Type drop down menu selection, select the Gyro Compass type.	
7. In the Heading Field, enter in the Vessel's current heading value (xxx.x Degrees format). Note: NMEA, No Gyro, and 1:1 Synchro Type selections do not require heading entry. 8. Click on "Next".	
The Modem section allows you to define the satellite modem "Type" and "I/O". For more information, refer to the Configuring The Satellite Modem Interface chapter.	

9. Using the drop down menu selection list, select the manufacture of the integrated satellite modem.	Modem Type Custom I/O iDirect Lock in Lock ☒ Off ☐ On Polarity ☒ Low ☐ Hi Voltage ☒ 3 ☐ 5 ☐ 12 12V pull up ☐ Off ☐ On Block output Polarity ☐ Low ☒ Hi 12V pull up ☐ Off ☐ On  Previous Next																												
10. Using the drop down menu selection list, select which of the MXP ports interfaced with the integrated satellite modem. 11. Click on “Next”.	Modem Type iDirect I/O Modem RJ45 Lock in Lock ☒ Off ☐ On Polarity ☐ Low ☐ Hi Voltage ☐ 3 ☐ 5 ☒ 12 12V pull up ☐ Off ☐ On Block output Polarity ☐ Low ☐ Hi 12V pull up ☐ Off ☐ On  Previous Next																												
The Blockage Zones section allows you to define known vessel structural blockages and/or radiation hazard zones. For more information, refer to the Setup – Blockage & RF Radiation Hazard Zones chapter.	Blockage Zones <table><tr><td>Zone1 [ENTER DESCRIPTION]</td><td>REL start 0.0</td><td>deg</td><td>REL end 0.0</td><td>deg</td><td>EL 90.0</td><td>deg</td></tr><tr><td>Zone2 [ENTER DESCRIPTION]</td><td>REL start 0.0</td><td>deg</td><td>REL end 0.0</td><td>deg</td><td>EL 90.0</td><td>deg</td></tr><tr><td>Zone3 [ENTER DESCRIPTION]</td><td>REL start 0.0</td><td>deg</td><td>REL end 0.0</td><td>deg</td><td>EL 90.0</td><td>deg</td></tr><tr><td>Zone4 [ENTER DESCRIPTION]</td><td>REL start 0.0</td><td>deg</td><td>REL end 0.0</td><td>deg</td><td>EL 90.0</td><td>deg</td></tr></table> Example  Previous Next	Zone1 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg	Zone2 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg	Zone3 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg	Zone4 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg
Zone1 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg																							
Zone2 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg																							
Zone3 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg																							
Zone4 [ENTER DESCRIPTION]	REL start 0.0	deg	REL end 0.0	deg	EL 90.0	deg																							

12. In the Zone entry field(s), type in a read only descriptive name of said blockage. 13. In the REL start entry field(s), type in the starting relative azimuth position of defined zone. NOTE: This is the more counter clockwise positional value, as referenced to the bow of the vessel. 14. In the REL end entry field(s), type in the ending relative azimuth position of defined zone. NOTE: This is the more clockwise positional value, as referenced to the bow of the vessel. 15. In the EL entry field(s), type in the Elevation angle of defined zone. NOTE: This elevation angle is based on beam center of the radome and the highest point of the blocking structure. 16. Click on “Next”.	Blockage Zones <table border="1"> <thead> <tr> <th>Zone</th> <th>Description</th> <th>REL start</th> <th>deg</th> <th>REL end</th> <th>deg</th> <th>EL</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>Zone1</td> <td>Mast</td> <td>20.0</td> <td>deg</td> <td>38.0</td> <td>deg</td> <td>90.0</td> <td>deg</td> </tr> <tr> <td>Zone2</td> <td>Passenger Lounge</td> <td>80.0</td> <td>deg</td> <td>100.0</td> <td>deg</td> <td>65.0</td> <td>deg</td> </tr> <tr> <td>Zone3</td> <td>Stack</td> <td>165.0</td> <td>deg</td> <td>175.0</td> <td>deg</td> <td>90.0</td> <td>deg</td> </tr> <tr> <td>Zone4</td> <td>[ENTER DESCRIPTION]</td> <td>0.0</td> <td>deg</td> <td>0.0</td> <td>deg</td> <td>90.0</td> <td>deg</td> </tr> </tbody> </table> Example Previous Next	Zone	Description	REL start	deg	REL end	deg	EL	deg	Zone1	Mast	20.0	deg	38.0	deg	90.0	deg	Zone2	Passenger Lounge	80.0	deg	100.0	deg	65.0	deg	Zone3	Stack	165.0	deg	175.0	deg	90.0	deg	Zone4	[ENTER DESCRIPTION]	0.0	deg	0.0	deg	90.0	deg
Zone	Description	REL start	deg	REL end	deg	EL	deg																																		
Zone1	Mast	20.0	deg	38.0	deg	90.0	deg																																		
Zone2	Passenger Lounge	80.0	deg	100.0	deg	65.0	deg																																		
Zone3	Stack	165.0	deg	175.0	deg	90.0	deg																																		
Zone4	[ENTER DESCRIPTION]	0.0	deg	0.0	deg	90.0	deg																																		
The Satellite Selection section allows you to select or define the satellite in which the system will use for the remainder of the commissioning process. For more information, refer to the Setup – Satellite Configuration chapter. 17. Click on “Add” to create a new satellite preset. NOTE: If this system has been previously commissioned, as may be the case if the wizard is being used as part of a post-install maintenance procedure and/or repair, you may use the Satellite Selection drop down menu to select a pre-existing satellite	Satellite Selection Select Satellite If you do not see a dropdown list or your desired satellite is not in the dropdown list, click Add to add a satellite																																								
18. Using spacecraft information, as provided by the service provider: ➤ Type in Satellite Name (you are defining the preset name) ➤ Type in the Longitude (orbital) position and then use the drop down menu selection to determine East/West for this preset. ➤ Type in the L-Band tracking Frequency for this preset.. ➤ Type in the known satellite Skew for this preset. ➤ Using the drop down menu selection, define the Transmit Polarity for this preset. ➤ Using the drop down menu selection, define the required LNB Band of operation for this preset. ➤ Using the mutually exclusive radio buttons, define whether to use the Xpol or CoPol LNB for tracking purposes. 19. Click on “Next”.	Satellite Selection Select Satellite If you do not see a dropdown list or your desired satellite is not in the dropdown list, click Add to add a satellite Add Satellite Satellite Name West Coast US Longitude 123 W Frequency 1193 MHz Skew 0 deg Tx Polarity HORIZ Band 2 Rx ☒ XPol ☐ CoPol Next																																								

The wizard will save the newly defined, or selected preset satellite information to the systems INI file	Saving satellite parameters.....Please wait
Upon successfully saving the above information, the system will automatically begin to the process of targeting and/or searching for the preset satellite. NOTE: If the satellite modem is not connected, or is not setup correctly, the system may not be able to find and lock on the satellite. In this case, you will have to exit the wizard and (later) star over.	Acquiring satellite signal may take up to 60 seconds.....Please wait 
20. After the system has reported that it has located and identified the desired satellite select "Auto" to calibrate the Azimuth and Elevation angular values. Note: Systems, with IMA software ver 105 installed, and with accurate gyro compass input, will calibrate both Relative and True North Azimuth values simultaneously.	Satellite Signal Found. Modem Rx: Locked 
The wizard will save the calibration parameters to the systems INI file	Loading trimed antenna parameters.....Please wait
21. Once completed, the wizard will display the Elevation and Azimuth Trim values calculated and saved in the step above. 22. Click on "Auto" to set the auto-threshold value for the system.	Trimed Elevation: -7.2 Azimuth: 13.7 
The wizard will calculate the required Threshold Offset parameter value used for setting the actual AGC threshold.	Calculating.....Please Wait
Once calculated, the wizard will save the Threshold Offset parameter to the systems INI file.	Loading trimed antenna parameters.....Please wait 

23. Once completed, the wizard will display the Threshold Offset parameter value calculated and saved in the step above. Next is the sub-procedure for performing commissioning tests with the Network. You need to contact your service provider to arrange to do these tests. The technician at the network will guide you through a process of operating the modem and the MXP to do pure carrier settings in the modem, adjusting modem power output up to P1Db and adjusting the polarity angle of the feed (from the MXP) to optimize cross-pol isolation. While communicating with the network and under the direction of the network technician, perform Cross Pol Isolation and 1Db compression tests. 24. Re-enter the wizard, return to this step and Select “Perform Test”	
25. Because you have already completed these tests, Click on “Next”.	Please call your service provider for CoPol / XPol test and for P1Db compression test Next
This section allows you to download the “commissioned state” INI file to a location of your choice (i.e. USB Drive, hard drive, LAN Location, etc.) 26. Click on “Download”.	Congratulations. Your antenna is configured properly. Now, click Download to save INI file Finish
27. Select to either Open or save the file to a location of your choice.	
28. Click on “Finish”. This will take you back to the System Configuration screen. Once there, you may continue to use the system in normal operation.	Congratulations. Your antenna is configured properly. Now, click Download to save INI file Finish

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6. Setup – Ship's Gyro Compass

The Ships Gyro Compass connection provides true heading (heading of the ship relative to true North) input to the system. This allows the ICU to target the antenna to a “true” Azimuth position to acquire any desired satellite.

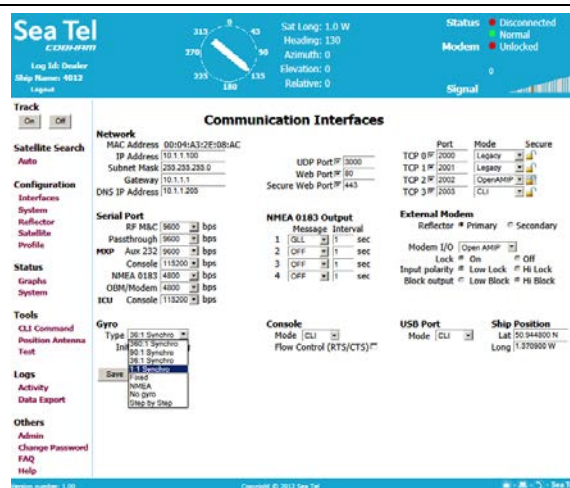
After targeting, this input keeps the antenna stabilized in Azimuth (keeps it pointed at the targeted satellite Azimuth).

6.1. Setting the Gyro Type

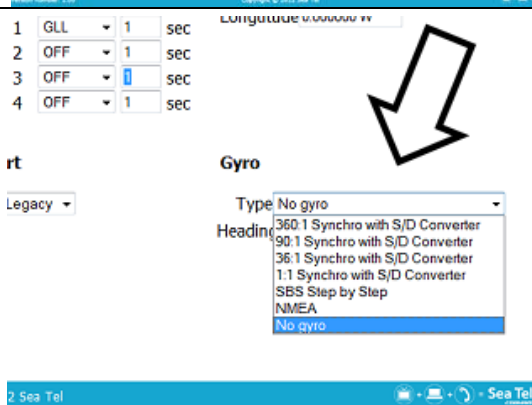
The GYRO TYPE parameter selects the type of gyro compass interface signal, the appropriate hardware connections, and the ratio of the expected input signal for ship turning compensation. Default GYRO TYPE parameter for all systems is Step-By-Step so that the ICU will properly follow for Step-By-Step or NMEA gyro signals.

If the Ships Gyro Compass output is Synchro, or there is NO Gyro Compass, the GYRO TYPE parameter must be set correctly to properly read and follow the Ships Gyro Compass signal that is being provided. To manually update the Gyro Type parameter:

1. Go to the Communications Interface screen.
2. Click the Gyro Type drop down menu..



3. Select the correct Gyro type.



4. Click Save, at the bottom left area of the screen.

Status

Graphs

System

Tools

CLI Command

Position Antenna

Test

Logs

Activity

Data Export

Others

Admin

Change Password

FAQ

Help

Serial Port

RF M&C 9600 bps

Passthrough 9600 bps

MXP Aux 232 9600 bps

Console 115200 bps

NMEA 0183 4800 bps

OBM/Modem 4800 bps

ICU Console 115200 bps

Console

Flow Control (RTS/CTS) ☐

Save

NMEA 0183

Input	Heading ID	HC
Output	Message	In
1	GLL	1
2	OFF	1
3	OFF	1
4	OFF	1

USB Port

Mode Legacy

6.2. If there is NO Ships Gyro Compass

Without heading input to the system the MXP will NOT be able to easily target, or stay stabilized ON, a “true” azimuth pointing angle. This will make satellite acquisition much more difficult and the true azimuth value that any given satellite should be at will not be displayed correctly.

This mode of operation is NOT recommended for ships or any other vessel that turns in the water. A better solution would be to provide a Satellite Compass (multiple GPS Antenna device) to provide true heading input to the MXP. These devices are readily available and are much less expensive than a Gyro Compass.

If there is NO Gyro Compass (ie on a large stationary rig which is anchored to the ocean floor) set the GYRO TYPE parameter to “No Gyro” or to “Fixed”.

Fixed mode is used when you do not have a gyro compass, but the ship/vessel/rig is stationary at a fixed heading that you can manually enter for satellite targeting. This allows you to use a standard (small) search pattern and acquire the satellite relatively quickly.

No gyro mode is used when you do not have a gyro compass, the ship does turn and you will use “Sky Search” to initially acquire the satellite. The Sky Search drives the antenna to the calculated elevation angle and then drives azimuth CW 450 degrees, steps elevation up and then drives azimuth CCW 450 degrees and continues to alternately steps elevation up/down and drives azimuth alternately CW/CCW 450 degrees. Because of this large search area, acquiring the satellite will take MUCH longer than if you have valid heading input.

1. Go to the Reflector Configuration page

2. To change: Set the Scan Rate parameter to 5 deg/sec.

Reflector Configuration

Select Reflector ☒ Primary ☐ Secondary

Trim

Auto Trim

EL 0.0 deg

CL 0.0 deg

AZ 0.0 deg

DishScan

Mode ☒ On ☐ Off

Search

Auto Search ☒ Enable ☐ Disable

Increment 1.0 deg

Limit 6.0 deg

Delay 30 sec

Scan Rate 2.0 deg/sec

Incline Limit 16.0 deg

External Modem

Input polarity ☒ Low lock ☐ Hi lock

Lock ☒ On ☐ Off

Blockage output ☐ Low block ☒ Hi block

Tracking Sensitivity

EL 50 %

AZ 50 %

Calculate Perform auto threshold calculation

Advanced Settings

LNB LO

Band 1 10.000 GHz

2 10.750 GHz

3 11.300 GHz

4 9.750 GHz

Dishscan Drive level

AZ 35 %

EL 20 %

CL 15 %

Phase 22.0 deg

Polang

Drive ☒ Auto ☐ Manual

Linear Offset 0.0 deg

Circular Offset 0.0 deg

Save

3. Turn on SAT REF Mode. (It must be turned on.)

System Configuration

Satellite Search
 Auto
 Manual

Configuration
 Interfaces
 System
 Reflector
 Satellite
 Profile

Status
 Graphs
 System

Tools
 CLI Command
 Position Antenna
 Test

Logs
 Activity
 Data Export

Others
 Admin
 Change Password
 FAQ
 Help

Blockage Zones

Zone	Description	REL start	deg	REL end	deg
Zone1	[Enter Description]	0.0	deg	0.0	deg
Zone2	[Enter Description]	0.0	deg	0.0	deg
Zone3	[Enter Description]	0.0	deg	0.0	deg
Zone4	[Enter Description]	0.0	deg	0.0	deg

Miscellaneous

Home Flag 0.0
 Sat Ref Mode ☒ On ☐ Off
 Auto Sat Load ☐ On ☒ Off
 Power Up ☐ On ☒ Off
 Search Failure ☐ On ☒ Off

Profile Number 0
 System SN 00000000000000000000
 Ship Name [Enter Ship Name]
 Antenna Name [Enter Description]

Advanced Settings

Vlim Ratio 2
 Slow Scan Vlim 0.1 deg/sec
 Step Resolution 0.1 deg
 Antenna Model MODELID
 Number of Reflectors 1

Drive Orientation

EL	CL	AZ	Reverse
☒ Forward	☒ Forward	☒ Forward	☐ Reverse
☐ Reverse	☐ Reverse	☐ Reverse	☒ Forward

Motor Gain

EL17	CL15	AZ16
☐ On	☐ On	☐ On
☒ On	☒ On	☒ On

Reference

EL	CL	AZ
☐ On	☐ On	☐ On
☒ On	☒ On	☒ On

Save

This combination of settings will cause "No Gyro" Search pattern to be used to find the desired satellite (refer to the setup – Searching chapter).

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7. Setup – Tracking Receiver – VSAT

If your system is using OpenAMIP these parameters will be set by the modem for the satellite/beam that the modem is using (this also allows for automatic beam switching to be controlled from the model, remotely controlled from the network).

Follow the instructions below to manually set these parameters. .

7.1. Determining the IF Tracking Frequency (MHz)

The IF Tracking frequency parameter is a value entered into the MXP MHz Sub-Menu. The value itself may be provided by your air-time provider and the MHz value will be entered directly in this sub-menu.

Or, the RF downlink frequency of a specific carrier on the desired satellite can be obtained from a satellite website and calculated by using the formula $RF - LO = IF$. When you take the Satellite Transponder Downlink RF value and subtract the LNB's Local Oscillator (LO) Value, the resultant value will equal the Intermediate Frequency (IF). It is this IF value that will be entered into the MXP for tracking purposes. The MHz and KHz are entered as a single value.

Example: Assuming an LNB LO value of 11.25GHz: We want to track a satellite downlink carrier at 12268.250 MHz
 $12268.250 \text{ MHz} - 11250.000 \text{ MHz} = 1018.250 \text{ MHz IF}$

Enter the entire six digits of the “megahertz and kilohertz” is simply entered as one value. This is done in the Position Antenna screen.

Sea Tel
COBRAH
Log Id: Dealer
Ship Name: CRUISE
Logout

Track
On Off

Satellite Search
Auto

Configuration
Interfaces
System
Reflector
Satellite
Profile

Status
CLI Command
Position Antenna
Test

Tools
CLI Command
Position Antenna
Test

Position Antenna

Satellite
Longitude 95.0 E
Frequency 1234.567 MHz
Skew 0.0 deg
Search Pattern Sky Search

Tx Polarity HORZ
Band 1
Reflector Primary
LNB XPOL
CoPol

Threshold
Auto mode On
Auto offset 140
Threshold 100

Advanced Operations
Antenna Name: TOWER Model: MODELID

Parameters:
AZ Target 0.0 deg
EL Target 0.0 deg
CL Target 0.0 deg

Operations
Auto Trim
Search Start Stop

7.2. SAT SKEW

SKEW is used to optimize the polarization of the feed to the desired satellite signal. It is entered when a known satellite is skewed.

Use Polang to peak the polarity.

Sea Tel
COBRAH
Log Id: Dealer
Ship Name: CRUISE
Logout

Track
On Off

Satellite Search
Auto

Configuration
Interfaces
System
Reflector
Satellite
Profile

Status
CLI Command
Position Antenna
Test

Tools
CLI Command
Position Antenna
Test

Satellite Configuration

Satellite Selection
Select Satellite
If you do not see a dropdown list or your desired satellite is not in the dropdown list, click Add Satellite to add a satellite

Add Satellite
Satellite Name
Longitude W
Frequency 1234.567 MHz
Skew 0 deg

Search Pattern Spiral
Tx Polarity HORZ
Band 2
Reflector Primary
LNB XPOL
CoPol

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8. Setup – Home Flag Offset (IMA Software 1.04 or lesser)

If you have IMA software version 1.05 or greater, please refer to the next chapter (Setup – Azimuth Trim).

In IMA software versions 1.04 and earlier Home Flag Offset is used to calibrate the relative azimuth value of the antenna to the bow line of the ship. This assures that the encoder input increments/decrements from this initialization value so that the encoder does not have to be precision aligned. When the antenna is pointed in-line with the bow (parallel to the bow) the “Relative” display value should be 000.0 Relative (360.0 = 000.0). Good calibration is especially important if blockage mapping is used, because the values entered into the AZ LIMIT parameters are entered in Relative Azimuth. The default Home Flag Offset value saved in the ICU is 000.

The default mounting of the radome is with its bow reference in-line with the bow and the base hatch in-line with the stern (aft reference of the radome). There are valid reasons for mounting the ADE in a different orientation than the default. One of these would be that the hatch of radome needs to be oriented inboard of the ship for safe entry into the dome (ie ADE is mounted on the Port, or Starboard, edge of the ship and safe entry is only available from inboard deck or inboard mast rungs).

Observe initialization of the antenna. When Azimuth drives CW and then stops at “Home” position, VISUALLY compare the antennas pointing, while at Home position, to the bow-line of the ship (parallel to the Bow).

If it appears to be very close to being parallel to the bow, you will not need to change the HFO and should proceed with Optimizing Targeting. When “Optimizing Targeting” small variations (up to +/- 5.0 degrees) in Azimuth can be easily corrected using the AZ TRIM feature.

If it is NOT close (stops before the bow or continues to drive past the bow) Sea Tel recommends that HFO be adjusted to calibrate the relative position of the antenna.

If the antenna is pointing to the LEFT of the bow line: If the antenna stops driving before the bow line, when targeting a satellite it will fall short of the desired satellite by exactly the same number of degrees that it fell short of the bow line. You must calibrate HFO using either of the methods below.

If the antenna is pointing to the RIGHT of the bow line: If the antenna continues to drive past the bow line, when targeting a satellite it will overshoot the desired satellite by exactly the same number of degrees that it went past the bow line. You must calibrate HFO using either of the methods below.

If you find that a large value of AZ TRIM parameter has been used to calibrate the antenna, This indicates that the Relative position is incorrect and should be “calibrated” using the correct HFO value instead of an Azimuth Trim offset.

If the radome was purposely rotated, has a large value of AZ TRIM or was inaccurately installed (greater than +/- 5 degrees), there are two ways of setting Home Flag to compensate for the mounting error. They are Electronic, or Mechanical, Calibration of Relative Antenna Position (Home Flag Offset).

Above, you VISUALLY compared the antenna pointing, while at “Home” position, to the bow-line of the ship and found that the antenna pointing was NOT close to being parallel to the bow-line. It stopped before the bow or went past the bow OR you found AZ TRIM has been set to a large value, therefore, HFO needs to be adjusted.

Ascertain the exact amount of error using the appropriate procedure below, enter the HFO to calibrate the antenna to the ship, save the value and re-initialize the antenna to begin using the new value.

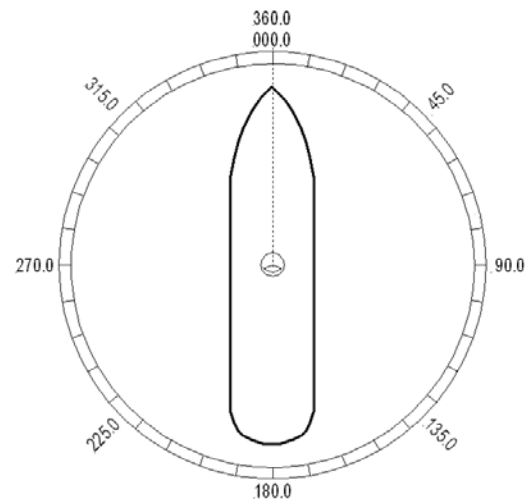


Figure 8-1 Antenna stops In-line with Bow

8.1. You Found a Large AZ TRIM value:

If Targeting has been optimized by entering a large value of AZ TRIM; First, verify that you are able to repeatably accurately target a desired satellite (within +/- 1.0 degrees). Then you can use the AZ TRIM value as the HFO value (so you can set AZ TRIM to zero). Set Home Flag to the AZ Trim value that was calculated (and click SAVE) and then set the AZ Trim value to zero (and click SAVE). Both AZ TRIM and Home Flag are entered as the number of degrees and tenths of degrees.

8.1.1. You Observe “Home” Pointing is LEFT of the Bow-line (minus HFO):

In this example, I observe that the Home position is short of the bow line.

I estimate that it is about 45 degrees.

I target my desired satellite and record the Calculated Azimuth to be 180.5.

I drive UP (I estimated that I will need to go UP about 45 degrees) and finally find my desired satellite.

Turn tracking ON to let the ACU peak the signal up. When peaked, the Azimuth is 227.0 degrees.

I subtract Calculated from Peak ($227 - 0180.5 = 46.5$) and difference is 46.5 degrees.

Because the antenna initialized to the left of the bow, I enter the offset as a minus value (-46.5). If you use AUTO TRIM, it will enter the correct offset for you.

I can calculate what the correct value for the Home position of the antenna by subtracting (because “home” was to the left of bow) this difference of 46.5 from the bow line position 360.0. Therefore “home” should be -46.5 Relative.

I set, and Save, HFO to 46.5 using the Home Flag entry window, located on the System Configuration screen. After I re-initialize the relative position of the antenna is now calibrated.

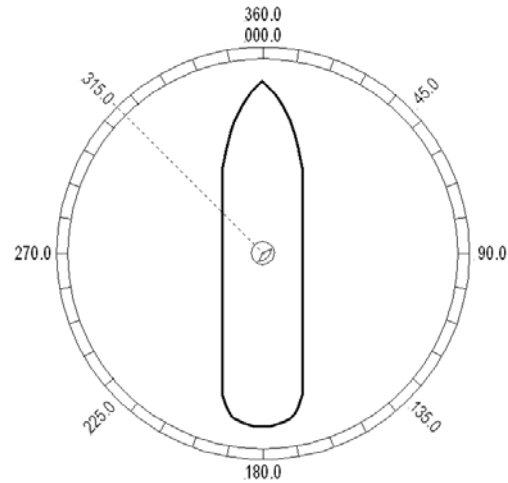


Figure 8-2 Antenna stopped before the Bow

8.1.2. You Observe “Home” Pointing is RIGHT of the Bow-line (positive HFO) :

In this example, I observe that the Home position is past the bow line.

I estimate that it is about 90 degrees.

I target my desired satellite and record the Calculated Azimuth to be 180.0.

I drive DOWN (I estimated that I will need to go DOWN about 89 degrees) and finally find my desired satellite.

Turn tracking ON to let the ACU peak the signal up. When peaked, the Azimuth is 90.0 degrees.

I subtract Calculated from Peak ($180.0 - 90.0 = 90.0$) and difference is 90.0 degrees.

Because the antenna initialized to the right of the bow, I enter the offset as a positive value (90.0). If you use AUTO TRIM, it will enter the correct offset for you.

I can calculate what the correct value for the Home position of the antenna by adding (because “home” was to the right of bow) this difference of 90.0 to the bow line position 000.0. Therefore “home” should be 90.0 Relative.

I set, and Save, HFO to 90.0 using the Home Flag entry window, located on the System Configuration screen (as shown in the previous section).

After I re-initialize the relative position of the antenna is now calibrated.

If there is a small amount of error remaining, I will use AZ TRIM in the Optimizing Targeting procedure to correct it (as shown in the previous section).

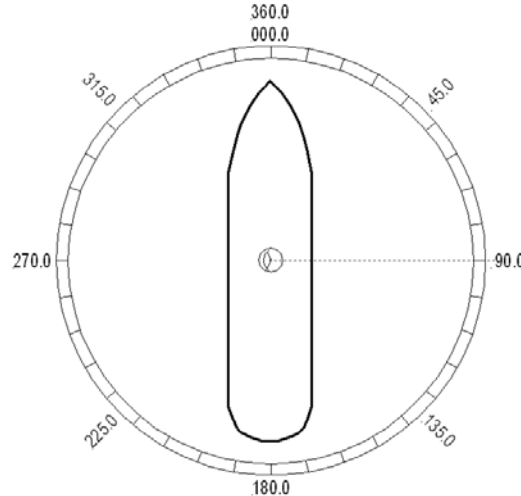
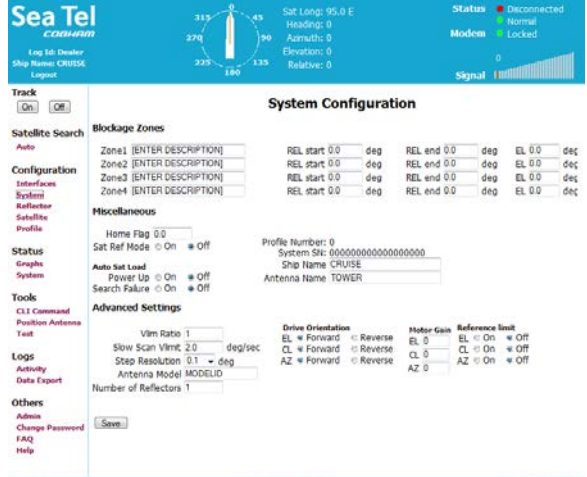
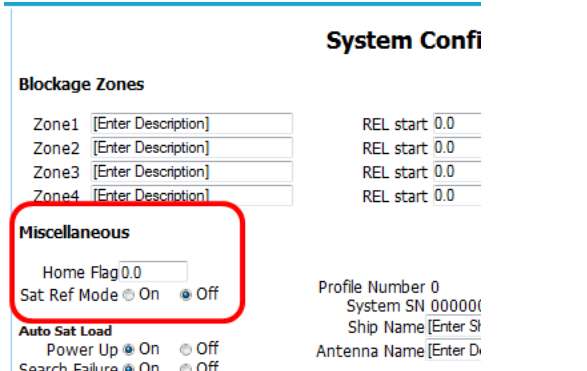
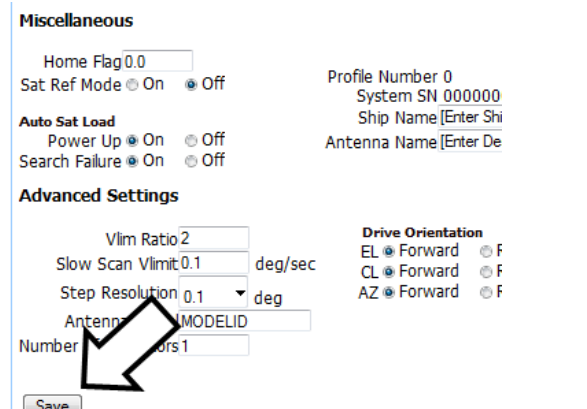


Figure 8-3 Antenna stops past the Bow

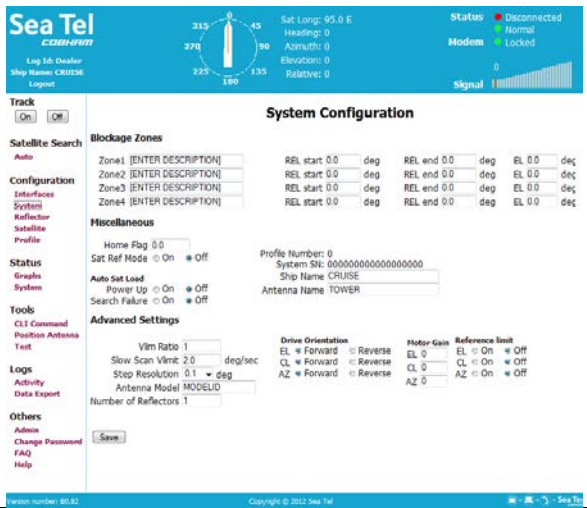
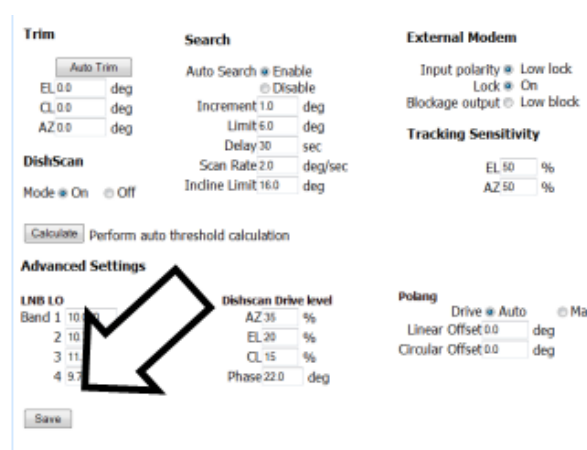
8.1.3. Entering a large value as Home Flag Offset

If the amount of offset is greater than +/-5 degrees, enter it as Home Flag Offset. If it is within +/-5 degrees, you should enter it in AZ TRIM.

1. Access the System Configuration screen	
2. Enter new Home Flag value (positive or negative value)	
3. Click SAVE	

8.1.4. Entering a small value as AZ TRIM

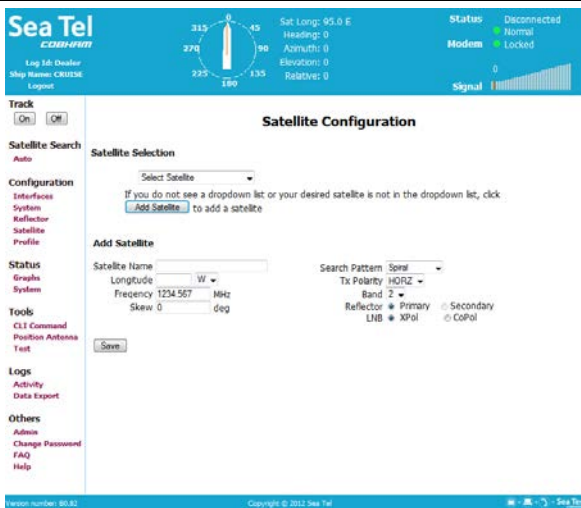
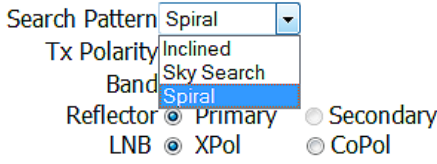
If the amount of offset is greater than +/-5 degrees, Sea Tel recommends that you enter it as Home Flag Offset. If it is within +/-5 degrees, you should enter it in AZ TRIM.

1. Access the Reflector Configuration screen	
2. Use Auto Trim, or enter the small amount of AZ Trim positive or negative value.	
3. Click SAVE	

9. Setup – Azimuth Trim (IMA Ver 1.05 or greater)

Beginning in IMA software version 1.05, calibrating the targeting of your antenna is much easier. This is accomplished improving Sky Search and changing the way that Azimuth Trim works so that the need for Home Flag Offset is eliminated. Azimuth Trim now corrects the relative position of the antenna in all configurations which have valid/accurate gyrocompass input.

If the antenna has been purposely mounted with the bow mark of the ADE not in alignment with the bow of the ship, such as for safe entry into the radome hatch, note and enter the approximate offset into the AZ TRIM parameter before searching for the satellite for the first time. **EXAMPLE:** The antenna is being mounted on the port side of the ship where it is unsafe for the hatch to be oriented directly in line with the stern. The installer rotates the ADE so that the bow mark is facing directly to the port and bolts that ADE into place. When first powering the system up, he will enter +90 in the AZ TRIM parameter to indicate that the ADE was rotated CW 90 degrees during the installation. This will make **initial** satellite acquisition faster (even though sky search would still find the satellite). This entry is only needed on a new installation that AUTO TRIM has not been run on yet. If the ADE had been similarly installed on the starboard side -90 degrees would have been entered to indicate that the ADE was rotated CCW 90 degrees during the installation.

1. Access the Satellite Configuration screen.	
2. Select Sky Search as your desired type of search pattern to use for this initial satellite acquisition on a newly installed antenna system.	
3. Select the satellite that your airtime services will be provided on in the Satellite Selection dropdown. 4. Refer to the next chapter to enter blockage zones as desired. 5. After the desired satellite has been acquired, allow the antenna to track for about 2 minutes BEFORE clicking Auto Trim. 6. Refer to Setup – Targeting – and follow the instruction for AUTO TRIM to optimize the targeting of the antenna.	

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10. Setup – Blockage & RF Radiation Hazard Zones

The Blockage Zones function inhibits the antenna from transmitting within certain pre-set zones. This is typically some structure of the ship that prevents satellite signal from getting to the Sea Tel antenna when the ship is at headings that put that structure in-between the satellite and the satellite antenna,

However, it can also be used as an RF Radiation Hazard zone. If there is an area where people may be near the antenna (within 2 meters), in the antennas transmitted beam for extended periods of time the zone can be set up so that transmit from the satellite antenna will be disabled whenever the antenna is pointed in that zone.

10.1. Radiation Hazard and Blockage Mapping

The MXP can be programmed with relative azimuth sectors (zones) where blockage exists or where transmit power would endanger personnel who are frequently in that area. Your MXP software allows you to set four zones.

When you create these ZONES (up to four), several things happen when the antenna is within any one of the zones:

1. Tracking continues as long as the AGC value is greater than the Threshold value. When the AGC value drops below Threshold, the antenna will wait “Search Delay” parameter amount of time and then re-target the satellite you targeted last. Timeout and re-target will continue until the satellite is re-acquired and tracking can resume.
2. The satellite modem transmission will be disabled until the antenna exits the zone.

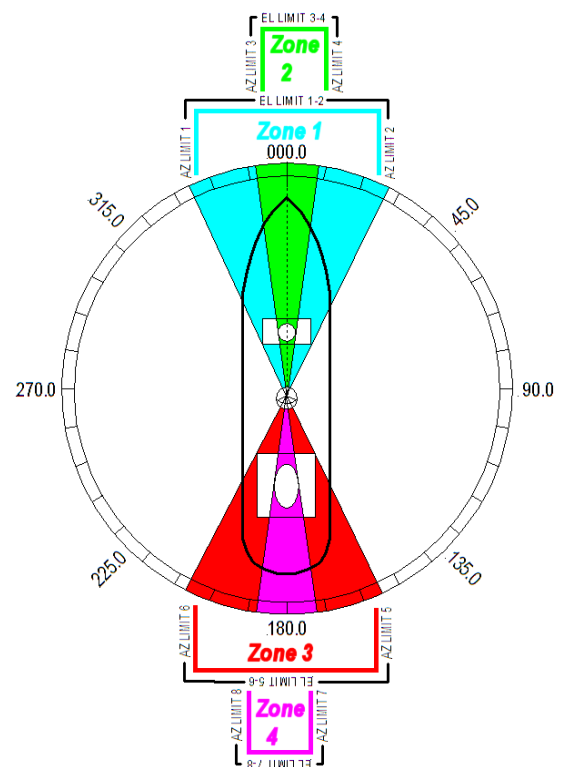
The lower and upper azimuth limits are entered into the REL start, REL stop and EL fields within the MXP for each of the blockage zones you wish to create (up to four). Each zone can also be given a name (ie Mast, Deckhouse or Stack):

REL Start is the Lower Relative AZ limit (this is the more counter-clockwise of the two points, even if it is numerically larger). **REL Stop** is the Upper Relative AZ limit (the more clockwise of the two points) for pattern mapping of each. Enter the elevation value that represents the top of the blockage between the two azimuth limit points in the **EL** field.

Repeat for up to four zones, click SAVE when completed.

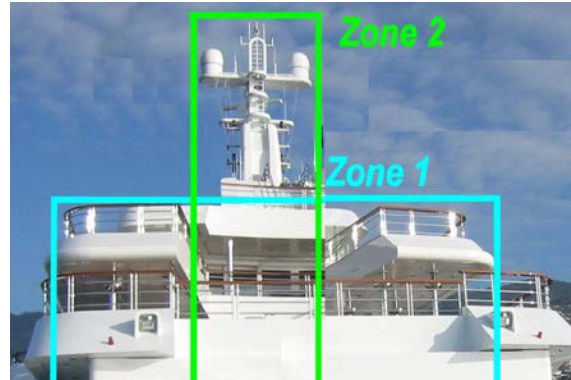
Programming instructions:

Determine the Relative AZ positions **where** blockage, or RF Radiation Hazard, exists. This may be done by monitoring the received signal level and the REL display readings while the ship turns or by graphing the expected blockage pattern. Elevation of the antenna in normal use also must be taken into consideration. A Mast or other structure may cause blockage at low elevation angles, but **may not** cause blockage when the antenna is at higher elevation angles where it is able to look over the structure. Up to four zones may be mapped. Only zones which are needed should be mapped.



EXAMPLE – Overlaid Blockage Zones: A ship has a Sea Tel antenna mounted on the center line of the ship. A mast mounted on top of a deckhouse (like the picture below) is forward and an engine exhaust stack, also on a deckhouse, is aft. These two blockage areas have wide azimuth blockage at lower elevations and then a narrower azimuth area of blockage extends up to a higher value of elevation.

ZONE 1 named “Fwd Deckhouse” begins (**REL Start**) at 334 degrees Relative and ends (**REL Stop**) at 026 degrees Relative. Enter **REL Start** value of 334.0 and **REL Stop** value of 26.0. In this case the mast height only causes blockage up to an elevation of 40 degrees, so we set **EL** to 40.0. If the antenna is between these two AZ Limit points but not in the “mast” zone AND the elevation is greater than 40 degrees, the antenna will no longer be blocked.



ZONE 2 named “Mast” begins (**REL Start**) at 352 degrees Relative and ends (**REL Stop**) at 008 degrees Relative. Enter **REL Start** value of 352.0 and **REL Stop** value of 8.0. In this case the mast height only causes blockage up to an elevation of 70 degrees, so we set **EL** to 70.0. If the antenna is between these two AZ Limit points but the elevation is greater than 70 degrees, the antenna will no longer be blocked.

ZONE 3 named “Aft Deckhouse” begins (**REL Start**) at 155 degrees Relative and ends (**REL Stop**) at 205 degrees Relative. Enter **REL Start** value of 155.0 and **REL Stop** value of 205.0. In this case the aft deckhouse height only causes blockage up to an elevation of 30 degrees, so we set **EL** to 30.0. If the antenna is between these two AZ Limit points but the elevation is greater than 30 degrees, the antenna will no longer be blocked.

ZONE 4 named “Stack” begins (**REL Start**) at 173 degrees Relative and ends (**REL Stop**) at 187 degrees Relative. Enter **REL Start** value of 173.0 and **REL Stop** value of 187.0. In this case the stack height only causes blockage up to an elevation of 55 degrees, so we set **EL** to 55.0. If the antenna is between these two AZ Limit points but the elevation is greater than 40 degrees, the antenna will no longer be blocked.

10.2. Programming Instructions:

1. To set up the blockage zones go to the System Configuration screen.

Sea Tel COM-HAM

Log Id: Dealer
Ship Name: CRUISE
Logout

Sat Long: 95.0 E
Heading: 0
Azimuth: 0
Elevation: 0
Relative: 0

Status: Disconnected
Modem: Normal
Signal: Locked

Track: ☐ On ☐ Off

Satellite Search:

Configuration:

Status:

Tools:

Logs:

Others:

Blockage Zones

Zone	REL start	REL end	EL
Zone1 [ENTER DESCRIPTION]	REL start 0.0 deg	REL end 0.0 deg	EL 0.0 deg
Zone2 [ENTER DESCRIPTION]	REL start 0.0 deg	REL end 0.0 deg	EL 0.0 deg
Zone3 [ENTER DESCRIPTION]	REL start 0.0 deg	REL end 0.0 deg	EL 0.0 deg
Zone4 [ENTER DESCRIPTION]	REL start 0.0 deg	REL end 0.0 deg	EL 0.0 deg

Miscellaneous

Home Flag 0.0

Sat Ref Mode ☐ On ☒ Off

Auto Set Load ☐ On ☒ Off

Search Failure ☐ On ☒ Off

Profile Number: 0
System SN: 00000000000000000000
Ship Name: CRUISE
Antenna Name: TOWER

Advanced Settings

Vlm Ratio 1

Slow Scan Vlm: 2.0

Stop Resolution 0.1

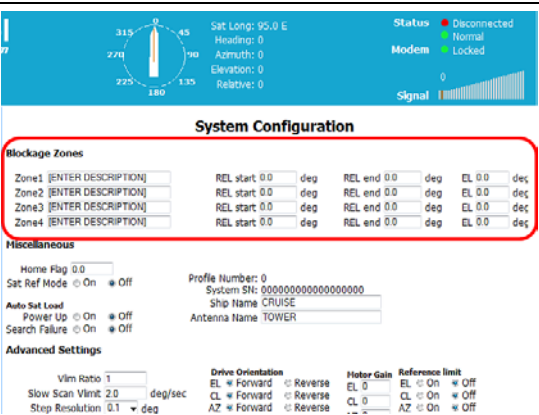
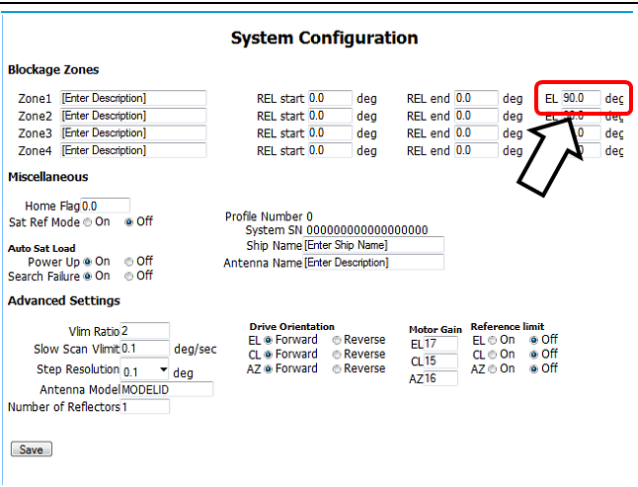
Antenna Model: MODEUD

Number of Reflectors: 1

Drive Orientation:
EL: ☐ Forward ☐ Reverse
CL: ☐ Forward ☐ Reverse
AZ: ☐ Forward ☐ Reverse

Motor Gain: ☐ On ☐ Off
Reference limit: ☐ On ☐ Off

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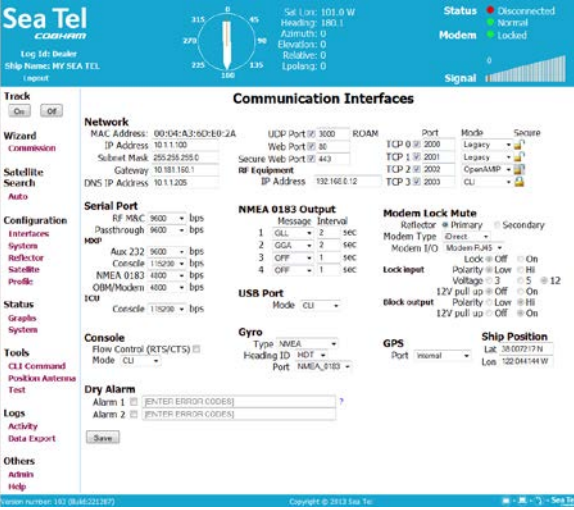
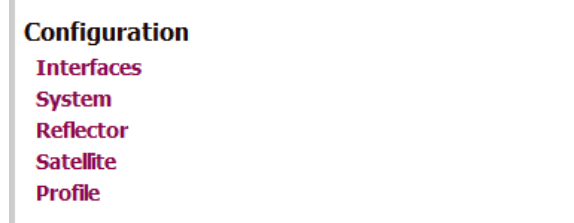
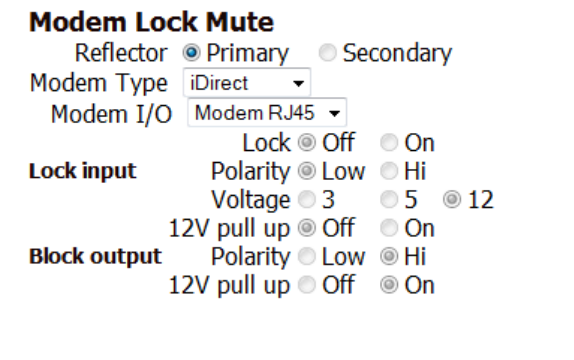
- Enter a readily identifiable name for the zone (ie Mast, Deck House or Stack). - Moving to the right, enter the relative of the starting point of this blockage zone (the more counter-clockwise bearing). - Then enter the relative bearing of the stop point of this blockage zone (the more clockwise of the two bearings).	
Likewise, for Elevation, you need only to enter the elevation angle, below which you want the transmitter inhibited (blocked).	
Repeat steps 2-5 to describe up to 4 blockage zones.	

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11. Configuring The Satellite Modem Interface.

The configuration setup of an integrated satellite modem to the MXP is accomplished via the Communication Interface Page (Configuration>Interfaces link on the navigational panel on the left hand side of the screen). In order to access this page, the user must be logged in as either “Dealer” or “SysAdmin”. The current software load, IMA Ver 105 at the time of this release) contains 6 commonly used satellite Modems (iDirect, Comtech, Gilat, Hughes, STM, and Viasat) as selectable presets and is typically a prompted selection when using the new Commissioning Wizard. However, the MXP allows configuration of a “Custom” modem type. The primary focus of this procedure is to define all of the parameter options made available to allow the commissioning technician to properly integrate any compatible L-Band Satellite modem.

11.1. Satellite Modem Interface

1. If not already, log into the system using the “Dealer” or “SysAdmin” credentials.	
2. On the left hand side of the screen, under Configuration, select the “Interfaces” link.	
3. On the right side of the screen, approximately half way down is the “Modem Lock Mute” section. This section is where the user, via drop down menu selection and/or mutually exclusive radio buttons, defines: • Reflector • Modem Type • Modem I/O • Lock Input • Block Output	

11.1.1. Reflector setting

Use: In a dual reflector based antenna system, the “Reflector” selection defines which reflector the modem configuration applies to.

Selection Type: Mutually Exclusive Radio Buttons

Options: Primary or Secondary

Notes: In the current Series 12 antennas this setting should always be set to PRIMARY. Failure to do so may in abnormal system operation.

Modem Lock Mute

Reflector ☒ Primary ☐ Secondary

Modem Type iDirect

Modem I/O Modem RJ45

Lock ☒ Off ☐ On

Lock input Polarity ☒ Low ☐ Hi

Voltage ☒ 3 ☐ 5 ☐ 12 result

12V pull up ☒ Off ☐ On

Block output Polarity ☐ Low ☒ Hi

12V pull up ☐ Off ☒ On

11.1.2. Modem Type setting

Use: This selection defines which manufacturer of satellite modem is to be interfaced with the system.

Selection Type: Drop down menu selection

Options: iDirect, ComTech, Gilat, Hughes, STM, Viasat, or Custom.

Notes: The selection of modem type (along with the modem I/O) allows the IMA software to configure the appropriate RX Network Lock, and TX Mute/Block output Lock interfaces per the modem manufacturers’ specifications.

Once you select one of the manufacturers and I/O from the dropdown list the other settings that are appropriate for that modem will be set for you (and greyed out). If your modem manufacturer is not listed, you will need to select “Custom” and manually configure the modem I/O properties. Refer to the custom settings information below.

Modem Type iDirect

Modem I/O iDirect

Lock input Off

Block output Low

1 3 Off Low

Viasat Custom

11.1.3. Modem I/O setting

Use: This selection defines which type (and location) of communication interface between the MXP and the satellite modem.

Selection Type: Drop down menu selection

Options: OpenAMIP, ROAM, TS1, TS2, or CLI.

Notes: The Modem I/O selections of iDirect’s **OpenAMIP** or ComTech’s **ROAM**, both forms of ABS (Automatic Beam Switching), communicate via TCP/IP traffic between the MXP’s J9 or J10 Ethernet port and the applicable modems Ethernet port. It should also be said that, to use these I/O types, there is a requirement that the integrated satellite modem and NOC (hardware and software) are properly configured and capable to support said feature.

Modem RJ45 is used for standard console port type connections where GPS forwarding is required (i.e. iDirect Console Port) in addition to Positive Satellite ID (RX Network Lock) and TX Mute/Blockage zone functionality

TS1 and **TS2** are hard wired interfaces used only for positive satellite ID (RX Lock) and TX mute functionality.

In some installations, **CLI (Command Line Interface)** may be desired. CLI is used when a third party ABS device (separate from satellite modem itself) is interfaced to provide antenna control, positive satellite ID (Rx Lock), and TX mute functionality via TCP/IP traffic between the MXP’s J9 or J10 Ethernet port, or Serial Traffic (Console), and the applicable devices Ethernet port.

Modem I/O Modem RJ45

Lock input Off

Block output Low

12V pull up Off

OpenAMIP ROAM TS1 TS2 CLI

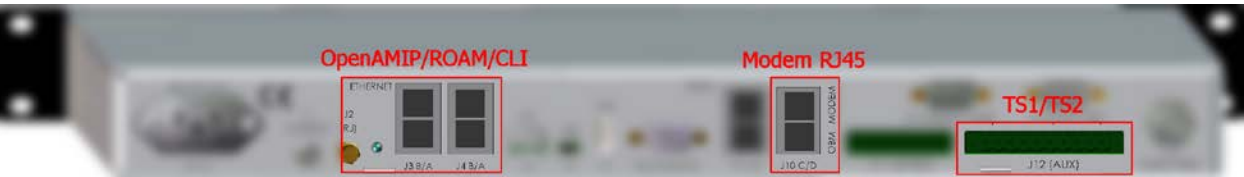


Figure 4 Available MXP Rear Panel Modem IO Ports

11.1.4. Modem I/O – Custom Settings

Use: The individual Modem I/O selections allow the user to manually define the expected driver (output) and detector (input) circuit(s) as well as positive satellite ID functionality between the MXP and the satellite modem.

Selection Type: Mutually Exclusive Radio Buttons

Options: Lock Input: On or Off, Polarity, 12V Pull up.

Block Output: Polarity and 12V Pull up

Notes: The lock input and Block output radio button selections may only be modified if the Modem Type “Custom” Modem Type has been selected.

If any of the other Modem Types are selected, the Lock Input and Block Output radio buttons are predefined for you by software and therefore become read only. This is evidenced to the user by disabling the selections, see image to right for an example of this.

11.1.4.1. Modem I/O – Lock ON/OFF

Use: The Modem I/O Lock Input “Lock” selection defines whether or not the MXP will use positive satellite ID functionality.

When OFF, the system will simply use the tracking receiver settings and the subsequent AGC from the receiver to track an acquired satellite. This may be the desired satellite or it may be an adjacent satellite that was acquired during a search for the desired satellite.

When ON, the system must get AGC and ALSO receive a network lock logic signal from the modem to continue tracking the acquired satellite. This prevents tracking the wrong satellite and verifies that the antenna is in fact on the desired satellite (to get network lock from the modem the antenna must be on the correct polarity of the correct satellite). If during a search an adjacent satellite is found, good AGC from the tracking receiver will cause the system to initially track/peak this satellite but be waiting for a network lock signal from the satellite. If the lock signal is not received within 30-40 seconds, that system will return to the search track line and resume searching for the satellite which provides AGC & Lock. Lock Input settings below MUST be set correctly for this functionality to work properly.

Selection Type: Mutually Exclusive Radio Buttons

Options: Lock ON or OFF.

Notes: Modem Type “Custom” must have been selected to allow changes to these settings. Setting Modem Lock to “ON” will enable the positive satellite ID feature whereas setting modem Lock to “OFF” disables the feature. With the exception of the some calibration procedures (ie during Cross-Pol isolation and 1dB compression tests) it highly recommended to leave this setting to ON. By doing so, you eliminate tracking on adjacent satellites for any extended amount of time (typically 30-40 seconds)

11.1.4.2. Modem I/O – Lock Input – Polarity

Use: The Modem I/O Lock Input Polarity selection defines whether the hard lined wire input provides a logic level high or logic level low as indication of Positive Satellite ID (RX Network Lock indication).

Selection Type: Mutually Exclusive Radio Button

Options: Polarity Low or Hi.

Notes: Modem Type “Custom” must have been selected to allow changes to this setting.

You must refer to your satellite modems manufacturers written specifications for its nominal receive lock indication output. Example if you have a satellite modem that provides a nominal 5VDC output when in a NON-Locked condition (off satellite) and 0Vdc when in a locked condition (on satellite), you would set Polarity to “Low”.

If your modem provides a continuity based output, short to ground is Low, and Open is High. If your modems output is continuity based logic the Voltage must be set to 12V and the 12V pull up must be set to “ON” (See Modem I/O Voltage & 12V Pull up sections below). Failure to do so may result in a false Rx Lock trigger when the applicable modem interface cable is removed for any reason.

11.1.4.3. Modem I/O – Lock Input - Voltage

Use: The Modem I/O Lock Input Voltage selection defines the nominal voltage range for the hard lined wire input for indication of Positive Satellite ID (RX Network Lock indication).

Selection Type: Mutually Exclusive Radio Buttons

Options: Voltage 3V, 5V or 12V.

Notes: Modem Type “Custom” must have been selected to allow changes to this setting.

You must refer to your satellite modems manufacturers written specifications for the receive lock indication voltage range that it provides as an output. The receive logic level itself is interpreted by the MXP based on the above mentioned Polarity selection (the actual Low versus Hi polarity trigger is 50% of selected voltage range). Example: You have a satellite modem that provides a 12VDC output range and Polarity has been set to Low. When the detected voltage is between 0 to 6Vdc, the MXP would interpret this as a Positive Satellite ID. Voltage between 6.1 and 12Vdc would be interpreted as a failed Positive Satellite ID (because it is High).

If your modem provides a continuity based output (short to ground is Low, and Open is high), you must set this selection to 12V.

11.1.4.4. Modem I/O – Lock Input - 12V Pull Up

Use: The Modem I/O Lock Input 12V Pull Up selection defines whether or not to use a built-in 12VDC Pull up resistor for the hard lined wire input for indication of Positive Satellite ID (RX Network Lock indication). The MXP requires a voltage input for this satellite ID functionality.

If your modem outputs continuity based logic, the pull up circuit (ON) converts the continuity to voltage. For all voltage based modem outputs, it MUST be set to OFF to prevent false Positive Sat ID indications (voltage high & higher, but never low).

Selection Type: Mutually Exclusive Radio Buttons

Options: 12V Pull Up Off or On.

Notes: Modem Type “Custom” must have been selected to allow changes to this setting.

If your modem provides a continuity based output (short to ground is Low, and Open is high) this selection must be set to “ON”. For all voltage based modem outputs, it MUST be set to OFF.

11.1.4.5. Modem I/O – Block Output – Polarity

Use: The Modem I/O - Block Output selection defines whether or not the MXP will provide a logic level Low or logic level Hi output when a condition exists that requires muting the IF transmission of the system. This is known as TX Mute functionality and is a signal from the MXP to the Satellite Modem (which in turn removes drive to the Block Up Converter mounted on the antenna assembly). The signal flow for this feature is from the MXP to the Satellite Modem.

Selection Type: Mutually Exclusive Radio Buttons

Options: Polarity Low or Hi.

Notes: Modem Type “Custom” must have been selected to allow changes to this setting.

You must refer to your satellite modems manufacturers written specifications for the input required to mute the modems output to the BUC. Ascertain whether the input signal must be Hi or Low logic to mute and whether it is continuity based logic or voltage based.

Example: If your satellite modem requires a Hi logic input (continuity or voltage) to cease transmissions you must select Hi.

There are numerous compliance laws (FCC and other worldwide entities) that mandate the ability and/or need to immediately mute transmit on a VSAT system when at least one of numerous predefined conditions are met. In most cases, these are conditions that ultimately determine that the system is not accurately pointed to the desired satellite. However there are some conditions where this may not be true, as is the case of the antenna being pointed at a pre-defined “Radiation Hazard Zone”, which discussed in detail within another chapter of this manual, is programmed in as a Blockage Zone, thus the name Block Output.

There may be an area on board the vessel in which crew and/or guests may be in the direct path of the terminals transmission to the satellite and might possibly be harmed by long term exposure to the microwave signal. This sector would be described as a blockage zone so that the transmissions from the antenna would cease when pointed in that area. Similarly a mast or other structure on the ship, directly in the beam path of the transmission, which would prevent transmitted signal from reaching the satellite and cause reflections which may degrade the signal or even be harmful to the antenna. These obstructions would also be described as a blockage zones. This similar in concept to “sector blanking” a radar array.

11.1.4.6. Modem I/O – Block Output – 12V Pull Up

Use: The Modem I/O Block Output 12V Pull Up selection defines whether or not use a built-in 12VDC Pull up resistor for the hard lined wire input for Blockage output (TX Mute).

If your modem requires a continuity based input (Short to ground is Low, and Open is High) this selection must be set to OFF. For all voltage based modem inputs, it **MUST** be set to ON.

Selection Type: Mutually Exclusive Radio Buttons

Options: 12V Pull Up OFF or ON.

Notes: Modem Type “Custom” must have been selected to allow changes to this setting.

Example: Your modem requires a high, voltage based, input to mute the modem. You would set Polarity to Hi and 12V Pull Up to ON.

If your modem required a low, continuity based, input to mute the modem. You would set Polarity to Low and 12V Pull Up to OFF.

11.2. Quick Reference: Common Modem Lock & Mute Settings

Modem Type	Compatible ABS Mode	Lock Input - Lock	Lock Input – Polarity	Lock Input – Voltage	Lock Input - 12V Pull Up	Block Output - Polarity	Block Output - 12V Pull Up
iDirect	OpenAMIP*	On	Low	12	Off	Hi	On
ComTech	ROAM*	On	Low	12	On	Low	On
Gilat	N/A	On	Low	12	Off	Low	Off
Hughes	N/A	On	Hi	12	Off	Hi	On
STM	N/A	On	Low	3	Off	Low	Off
Viasat	N/A	On	Low	12	Off	Low	Off
Custom	CLI*	On	As Required	As Required	As Required	As Required	As Required

***NOTE:** When interfacing ABS (via Ethernet connection) Lock input and Block Output selections have no operational impact.

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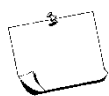
12. Setup – Targeting

Optimize the targeting of the antenna to track on or near a desired satellite (within +/- 1 degree).

12.1. AUTO TRIM

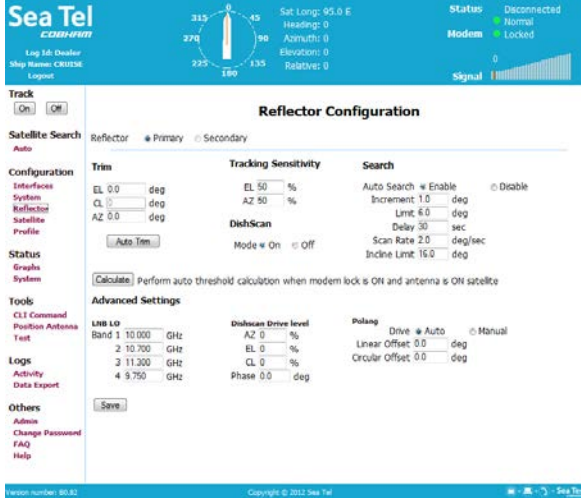
The Auto Trim function will automatically calculate and set the required Azimuth and Elevation trim offset parameters required to properly calibrate the antennas display to the mechanical angle of the antenna itself, while peaked ON satellite.

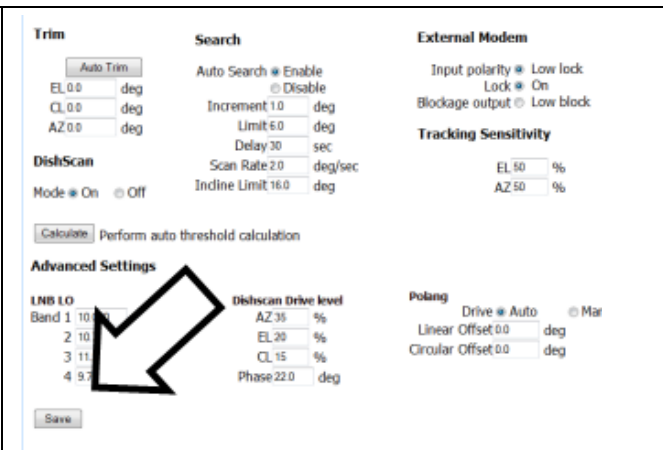
After locating the satellite, with Tracking ON, **wait at least 2 minutes** before performing the AUTO TRIM, this will allow sufficient time for the antenna to peak up on the satellite signal and for the targeting loops to completely stabilize. It is equally important that you verify that the system is tracking the CORRECT satellite (verify a RX lock indication on the satellite modem).



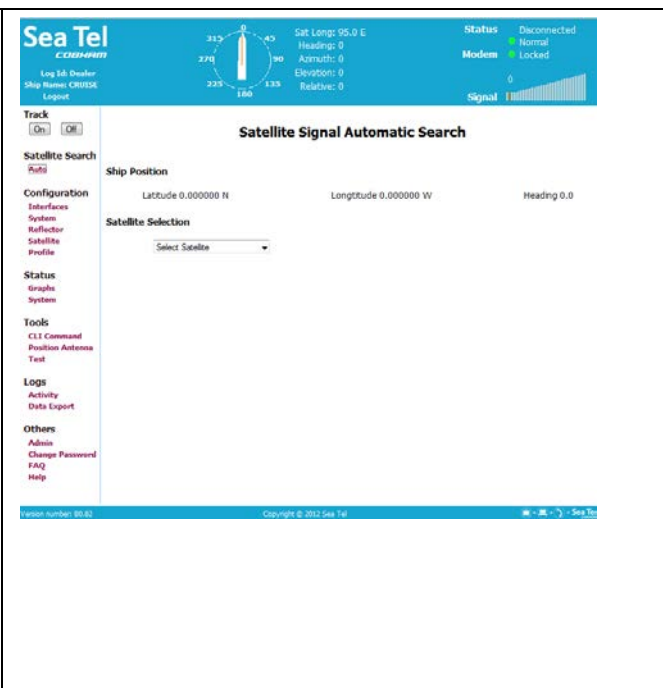
NOTE: The AUTO TRIM feature is NOT allowed unless all of these conditions are met:

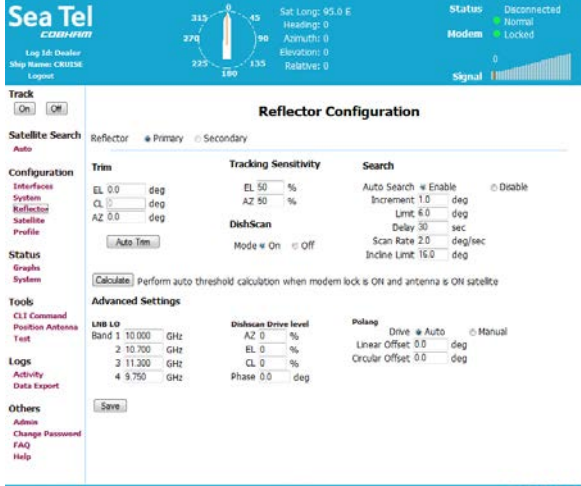
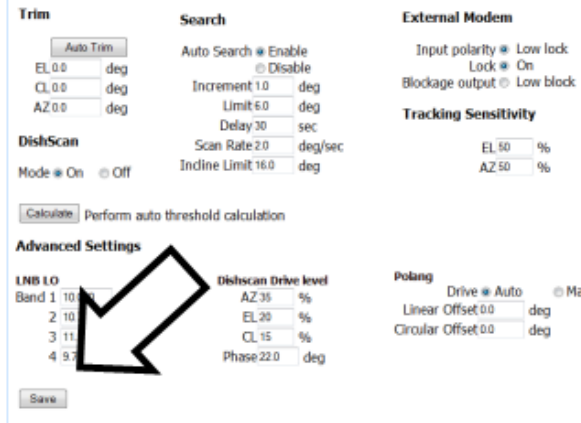
- The antenna must be actively tracking a satellite (AGC above threshold) **AND**
- The antenna must have positive SAT ID (RX lock input from the Satellite Modem) **AND**
- The elevation angle of the antenna must be LESS than 83 degrees **AND**
- The antenna must NOT be set for Inclined Orbit Search **AND**
- The system must NOT be set for “No Gyro” mode.

1. To activate the Auto Trim function go to the Reflector Configuration screen.	
2. Click on the Auto Trim button. This does not save these parameters to NVRAM, in order to save to memory, click the Save button.	

3. Click SAVE	 Trim Auto Trim Auto Trim EL 0.0 deg CL 0.0 deg AZ 0.0 deg DishScan Mode ☒ On ☐ Off Search Auto Search ☒ Enable ☐ Disable Increment 1.0 deg Limit 6.0 deg Delay 30 sec Scan Rate 2.0 deg/sec Incline Limit 16.0 deg External Modem Input polarity ☒ Low lock Lock ☒ On Blockage output ☐ Low block Tracking Sensitivity EL 50 % AZ 50 % Advanced Settings LNBS LO Band 1 10.0 2 10.0 3 11.0 4 9.5 Dishscan Drive level AZ 35 % EL 20 % CL 15 % Phase 22.0 deg Poling Drive ☒ Auto ☐ Mar Linear Offset 0.0 deg Circular Offset 0.0 deg Save
----------------------	--

12.2. Manually Optimizing Targeting

- First, assure that all of your Ship & Satellite settings in the MXP are correct. - Access the Satellite Search screen - Target the desired satellite by selecting it from the drop down list. You will see a message “Acquiring Satellite Signal...Please Wait” displayed. - Watch the Azimuth and Elevation values displayed in the center area of the banner and prepare to click the Track OFF button. When targeting the antenna will initially drive to an elevation position that is 8 degrees above (or below if the elevation is greater than 83 degrees) the actual calculated position that the satellite should be at. After azimuth and polarization also finish driving, the elevation will drive to the actual elevation of the satellite	 Sea Tel Log Id: Dealer Ship Name: CHUSK Logout Track ☒ On ☐ Off Satellite Search Configuration System Reflector Satellite Profile Status Graphs System Tools CL1 Command Position Antenna Test Logs Activity Data Export Others Admin Change Password FAQ Help Version Number: 80.00 Copyright © 2012 Sea Tel
As soon as the elevation drives (up or down) 8 degrees click the Track OFF button and record the Azimuth and Elevation positions (these are the Calculated positions)..	
Click Track ON button and allow the antenna to search, acquire and track the desired satellite. As this happens you will see “Satellite Signal Found” and “Modem Lock: LOCKED” messages displayed. Select the Position Antenna screen., turn Tracking OFF and click Save.	
- After the antenna has been tracking for several minutes, record the Azimuth and Elevation positions of the antenna (these are the Peak positions). - Subtract the Peak Positions from the Calculated Positions to determine the amount of Trim which is required.	

9. Access the Reflector Configuration page.	
10. Enter the Elevation Trim in the EL field. 11. Enter the Azimuth Trim in the AZ field.	
12. Click Save. 13. Re-target the satellite several times to verify that targeting is now driving the antenna to a position that is within +/- 1.0 degrees of where the satellite signal is located.	
EXAMPLE: The antenna initially targets to an Elevation position of 38.0 degrees and an Azimuth position of 180.2. Shortly after that the Elevation drives to 30.0 degrees and Azimuth stays at 180.2 (Calculated), you find that Peak Elevation while ON your desired satellite is 31.5 degrees and Peak Azimuth is 178.0. You would enter an EL TRIM value of -1.5 degrees and an AZ TRIM of +2.2 degrees. After these trims values have been set, your peak “ON” satellite Azimuth and Elevation displays would be very near 180.2 and 30.0 respectively.	

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13. Setup – Satellite Configuration

If you are using a remotely controlled ABS network control configuration (ie OpenAMIP, ROAM or legacy ABS direct connection to the MXP disregard this chapter as the network will make all changes in the MXP for the new beam or satellite to be used.

The values that these parameters are set to depends on the hardware configuration required for each satellite. Configure each of the satellites that airtime services will be provided on so that any one of them can be selected, remotely or by the user onboard. The satellite selection will in turn control the hardware on the antenna pedestal to select the correct TX & RX hardware and the correct tracking settings.

Sea Tel provides quad-band LNBS as standard on the Ku-Band feed assemblies.

13.1. Searching Patterns

The MXP will initiate an automated search pattern after AGC falls below the current Threshold setting (indicates that satellite signal has been lost). The SEARCH DELAY parameter sets the amount of delay, in seconds that the MXP will wait after AGC has fallen below the threshold value before it starts a search. Below are the choices of patterns that each satellite can be set to.

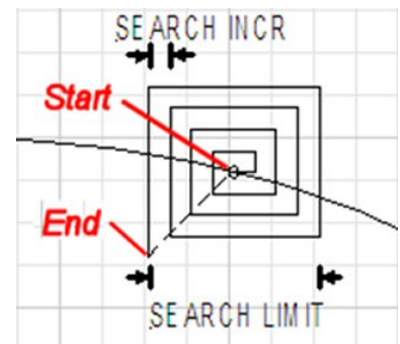
13.1.1. Default “Spiral” (Box) Search Pattern

The factory default search pattern in the MXP is a “Spiral” pattern.

When a search begins;

The antenna will then search up in azimuth one Search Increment, search up one Search Increment in elevation, search down two Search Increments in azimuth, search down two Search Increments in elevation, etc until Search Limit is reached. When the end of the search pattern is reached, the MXP will retarget the antenna to the calculated Azimuth and Elevation position of the desired satellite (start point).

If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the MXP will terminate search and go into Tracking mode. If the desired signal is not found the MXP will wait SEARCH DELAY seconds and then begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.

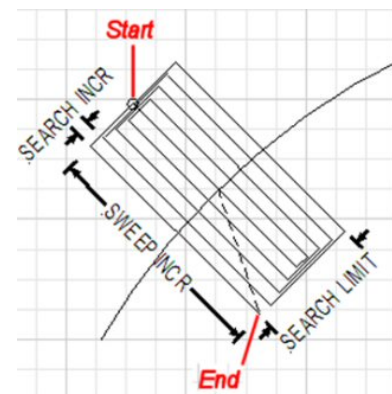


13.1.2. Inclined Orbit Search Pattern

Some older satellites, in order to save fuel to keep them exactly positioned over the Equator, are in an inclined geosynchronous orbit. The satellite remains geosynchronous but is no longer geostationary. From a fixed observation point on Earth, it would appear to trace out a figure-eight with lobes oriented north-southward once every twenty-four hours. The north-south excursions of the satellite may be too far off the center point for a default box search pattern to find that satellite at all times during the 24 hour period.

When a search begins;

Initially the antenna will go to a calculated position that is half of SWEEP INCR degrees above, and perpendicular to, the satellite arc (along the same angle as polarization for the desired satellite). This position is the “Start” of the search pattern in the graphic above. Then the antenna will drive down along the polarization angle SWEEP INCR degrees, step one Search Increment to the right (parallel to the satellite arc), search up along the polarization angle SWEEP INCR degrees, step two Search Increments to the left, search down, etc expanding out in the search pattern until Search Limit is reached. When the end of



the search pattern is reached, the MXP will retarget the antenna to the calculated Azimuth and Elevation point.

If the desired signal is found (AND network lock is achieved in the satellite modem) at this position, or anywhere within the search pattern, the MXP will terminate search and go into Tracking mode. If the desired signal is not found the MXP will wait SEARCH DELAY, then target the antenna to start point shown in the graphic above and begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.

13.1.3. Sky Search Pattern

A Sky Search pattern does a hemispheric pattern. Its behavior is different if you have a gyro compass input or not:

No Gyro - If you do not have gyro compass set the gyro type to “no gyro”. When in this mode, Sky Search drives the antenna to the calculated elevation angle and then drives azimuth CW 450 degrees, steps elevation up and then drives azimuth CCW 450 degrees and continues to alternately steps elevation up/down and drives azimuth alternately CW/CCW 450 degrees. Because of this large search area, acquiring the satellite will take longer than if you have valid heading input. If the end of the search pattern is reached, the MXP will retarget the antenna back to the start point shown in the graphic below.

With Gyro - If you have gyro compass set the gyro type to the appropriate selection. When in this mode, Sky Search drives the antenna to the calculated elevation angle and then drives azimuth CW **360** degrees, steps elevation up and then drives azimuth CCW **360** degrees and continues to alternately steps elevation up/down and drives azimuth alternately CW/CCW **360** degrees. Because of this large search area, acquiring the satellite will take less time because you have valid heading input. If the end of the search pattern is reached, the MXP will retarget the antenna back to the start point shown in the graphic below.



If the desired signal is found (AND network lock is achieved in the satellite modem) at any position within the search pattern, the MXP will terminate search and go into Tracking mode.

If the desired signal is not found within the search pattern the MXP will wait SEARCH DELAY seconds and then begin the search pattern again. This cycle will repeat until the desired satellite signal is found or the operator intervenes.

13.2. TX Pol select

Is used to select the transmit polarity of the C-Band Linear/Circular selectable feed, or the Ku-Band linear feed, whichever is currently installed.

13.3. Band select

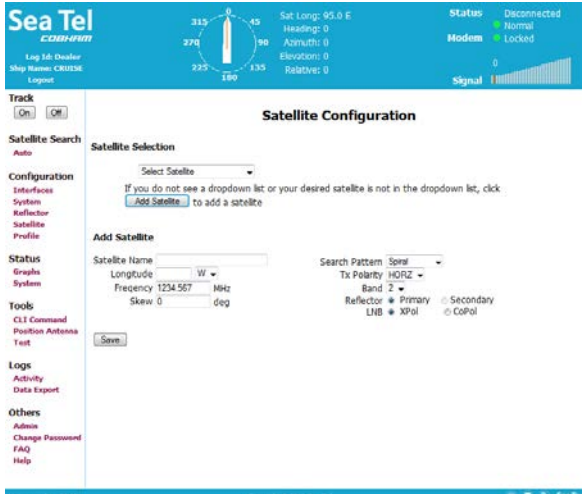
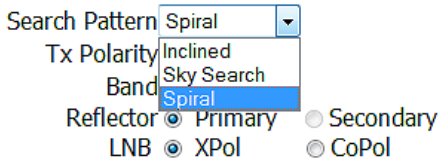
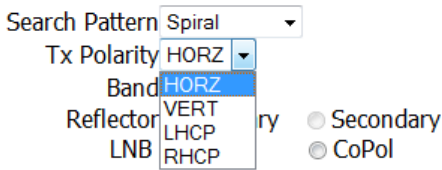
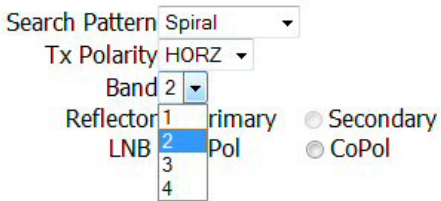
Controls the band selection of the selected LNB (X-Pol or Co-Pol) on the Ku-Band linear feed ONLY. This setting works in conjunction with the X-Pol / Co-Pol selection setting.

13.4. X-Pol / Co-Pol select

Selects the desired (X-Pol or Co-Pol) on the Ku-Band linear feed ONLY. This setting works in conjunction with the band selection setting.

13.5. Selecting/Configuring Your Satellite Configuration

Choose a predefined satellite configuration or create a new one using the steps below.

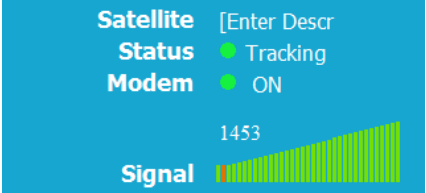
1. Access the Satellite Configuration screen. 2. Select the satellite that your airtime services will be provided on.	
3. Select the desired type of search pattern to use for this satellite.	
4. Select desired TX Polarity from the drop down menu.	
5. Select desired Band from its drop down menu.	

6. Assure that reflector is set to “Primary”. 7. Select Cross-Pol LNB (XPol) or Co-Pol LNB (CoPol) as is appropriate for this satellite.	Search Pattern Spiral Tx Polarity HORZ Band 2 Reflector ☒ Primary ☐ Secondary LNB ☒ XPol ☐ CoPol
8. Click the Save button.	Sea Tel Log In: Dealer Ship Name: CRUISE Logout 215 270 225 0 45 90 135 180 Sat Long: 95.0 E Heading: 0 Azimuth: 0 Elevation: 0 Relative: 0 Status Modem Signal Track On Off Satellite Search Auto Configuration Interfaces System Reflector Satellite Profile Status Graphs System Tools CLI Command Position Antenna Test Icons Satellite Selection Select Satellite If you do not see a dropdown list or your desired satellite is not in the dropdown list, click Add Satellite to add a satellite Add Satellite Satellite Name Longitude W Frequency 1234.567 MHz Skew 0 deg Save Search Pattern Spiral Tx Polarity HORZ Band 2 Reflector ☒ Primary ☐ Secondary LNB ☒ XPol ☐ CoPol

14. Quick Start Operation

If your system has been set up correctly, and if the ship has not moved since the system was used last, the system should automatically acquire the satellite from a cold (power-up) start. Once the satellite has been acquired, the modem then should achieve lock and you should be able to use the system.

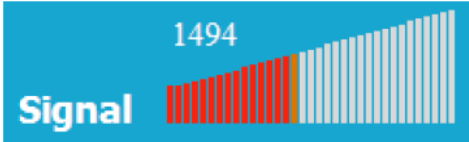
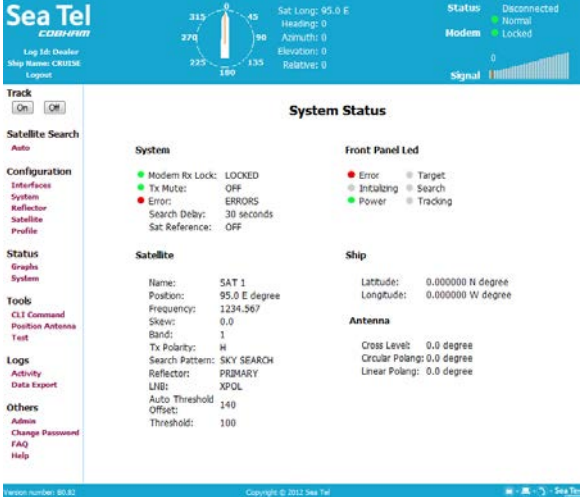
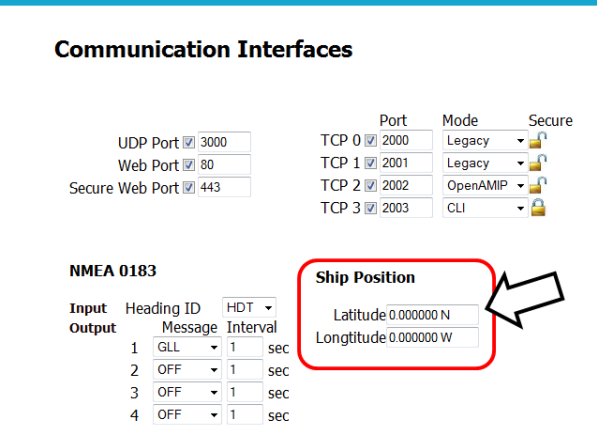
14.1. If satellite signal is found AND network lock is achieved:

Tracking will take over (front panel Tracking LED will be ON) and automatically peak the antenna position for highest receive signal level from the satellite.	
- When the ICU has signal above threshold AND modem has network lock the antenna will continue to track the satellite. - Satellite Name (if entered), Tracking indicator, Modem Lock indicator and signal level (number value and bar graph) will be displayed in the header of the MXP GUI pages.	
Upon completion of the above, the system will continue to operate automatically, indefinitely until: - AC power to the system is interrupted OR - The satellite signal is blocked OR - The ship sails into an area of insufficient satellite signal strength/level.	

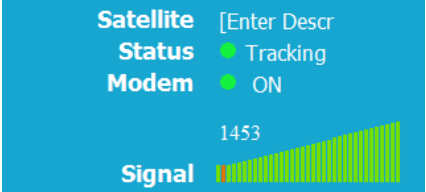
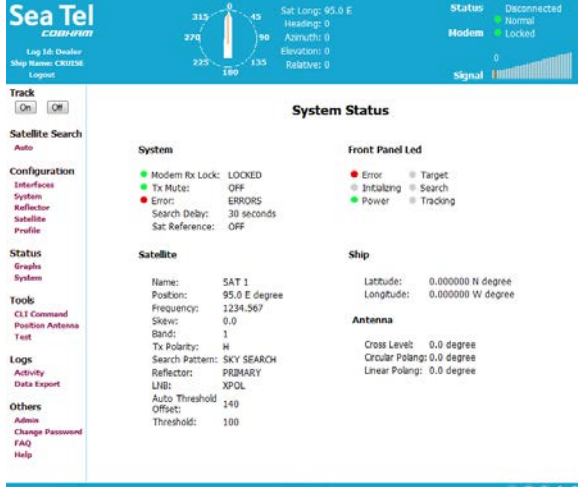
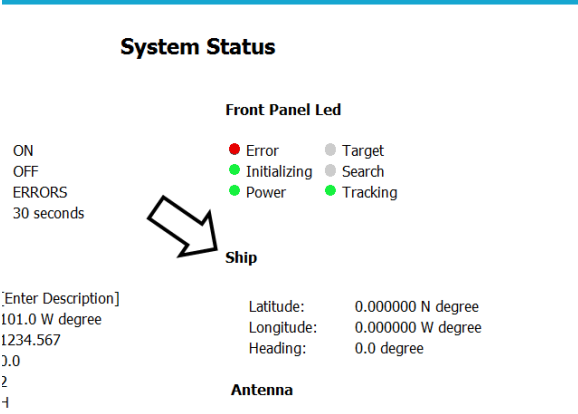
14.2. If no signal is found:

If the system does NOT automatically find the satellite from a cold start, follow the steps below:

- The Tracking LED will flash for a short period of time (Search Delay) followed by the Search LED coming ON. - The ICU will automatically move the antenna in the selected Search pattern until looking for a signal value that is greater than the threshold value (red bar in the bar graph).	
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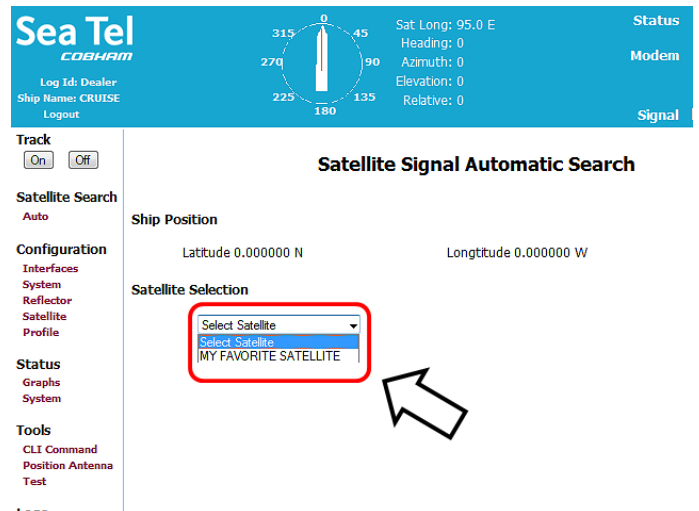
- Not finding a signal greater than Threshold, the bar graph will stay red and the antenna will reach the end of the prescribed search pattern. - The antenna will retarget and the cycle will repeat (Search Delay timeout, conduct search pattern followed by retarget).	
- Check Latitude, Longitude and Heading. These should be correct, but may be updated if necessary. - Access the System Status screen. - Find the Latitude, Longitude (under Ship) and Heading (in the banner) displayed values. If they are correct skip to step 12.	
- If the Latitude & Longitude values are not correct, access the Communication Interfaces screen and enter the ships Latitude & Longitude position in the fields provided. - If the Heading value is not correct, enter the correct value in the lower right field of the Communication Interfaces screen. If the system is set for NMEA or 1:1 type, you will not be able to enter a heading value. - Click Save.	
- Check for blockage (this is the MOST common cause of not being able to acquire the desired satellite). - Verify that the correct satellite is selected. - Check cable connections to assure that a cable has not been disconnected.	

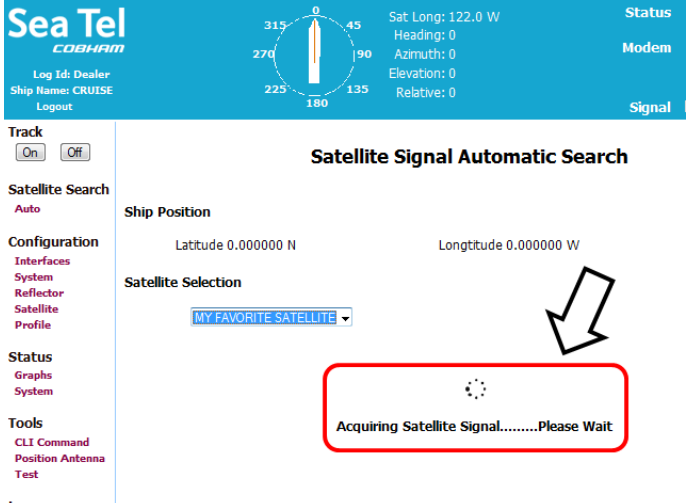
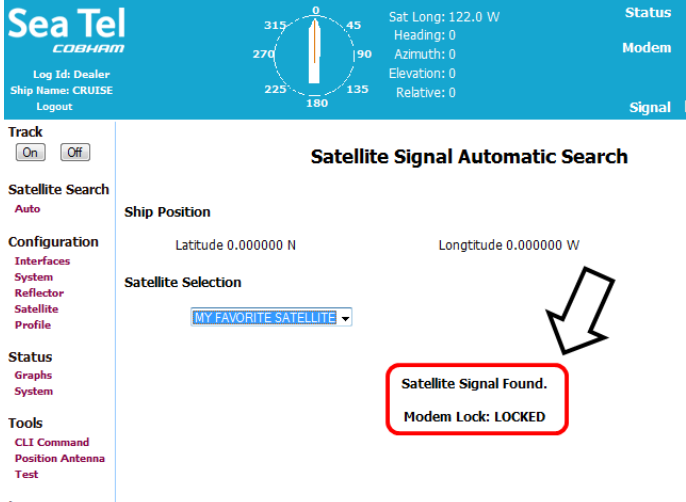
14.3. If satellite signal is found but network lock is NOT achieved:

1. The Tracking LED will flash for a short period of time (Search Delay) followed by the Search LED coming ON.	
2. The ICU will automatically move the antenna in the selected Search pattern until it receives a signal value that is greater than the threshold value (red bar in the bar graph). If signal above Threshold is found, Tracking will take over (Tracking LED ON) and automatically peak the antenna position for highest receive signal level from the satellite which has been acquired. The system will wait for the modem to achieve lock. If the modem does not get lock, the antenna will resume its search pattern.	
3. If the system does not acquire the correct satellite within the prescribed search pattern, the antenna will retarget and the cycle will repeat (Search Delay timeout, conduct search pattern followed by retarget). 4. Check Latitude, Longitude and Heading. These should be correct, but may be updated if necessary. 5. Access the System Status screen.	
6. Find the Latitude, Longitude and Heading displayed values. If they are correct skip to step 11.	

7. If the Latitude & Longitude values are not correct, access the Communication Interfaces screen and enter the ships Latitude & Longitude position in the fields provided. 8. Click Save.	Communication Interfaces UDP Port ☒ 3000 Web Port ☒ 80 Secure Web Port ☒ 443 Port TCP 0 ☒ 2000 TCP 1 ☒ 2001 TCP 2 ☒ 2002 TCP 3 ☒ 2003 Mode Legacy ☐ Legacy ☐ OpenAMIP ☐ CLI ☐ Secure NMEA 0183 Input Output Heading ID Message Interval HDT 1 2 3 4 GLL OFF OFF OFF 1 1 1 1 sec sec sec sec Ship Position Latitude 0.000000 N Longitude 0.000000 W
9. If the Heading value is not correct, enter the correct value in the lower left field of the Communication Interfaces screen. 10. Click Save.	
11. Check for blockage (this is the MOST common cause of not being able to acquire the desired satellite). 12. Verify that the correct satellite is selected. 13. Check for polarization drive failure. 14. Check for improper polarization alignment/position.	
15. Check cable connections to assure that a cable has not been disconnected. 16. Verify that the modem option file is correct. 17. Check the modem for failure.	

14.4. To Target a different satellite

To target a different satellite go to the Satellite Search Auto screen and select the desired satellite from the drop down list.	 Sea Tel COBHAM Log Id: Dealer Ship Name: CRUISE Logout Sat Long: 95.0 E Heading: 0 Azimuth: 0 Elevation: 0 Relative: 0 Status Modem Signal Track ☒ On ☐ Off Satellite Search Auto Configuration Interfaces System Reflector Satellite Profile Status Graphs System Tools CLI Command Position Antenna Test Logs Satellite Signal Automatic Search Ship Position Latitude 0.000000 N Longitude 0.000000 W Satellite Selection Select Satellite MY FAVORITE SATELLITE
--	--

2. When you make that selection you will see the temporary message: Acquiring Satellite Signal...Please Wait	 The screenshot shows the Sea Tel COBHAM web interface. The top header includes a compass rose, status information (Sat Long: 122.0 W, Heading: 0, Azimuth: 0, Elevation: 0, Relative: 0), and tabs for Status, Modem, and Signal. The left sidebar contains navigation links: Track (On/Off), Satellite Search (Auto), Configuration (Interfaces, System, Reflector, Satellite, Profile), Status (Graphs, System), Tools (CLI Command, Position Antenna, Test), and Logs. The main content area is titled 'Satellite Signal Automatic Search' and displays 'Ship Position' (Latitude 0.000000 N, Longitude 0.000000 W) and 'Satellite Selection' (MY FAVORITE SATELLITE). A red box highlights the message 'Acquiring Satellite Signal.....Please Wait' with a black arrow pointing to it.
3. Shortly after that you will see the temporary message: Satellite Signal Found. Modem Lock: LOCKED	 The screenshot shows the same Sea Tel COBHAM web interface. The status information and navigation links are identical. The main content area now displays 'Satellite Signal Found.' and 'Modem Lock: LOCKED'. A red box highlights this message with a black arrow pointing to it.

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15. Optimizing Cross-Pol Isolation

Now that all of the other setup items have been checked and changed as necessary, it is time to contact the NOC to arrange for cross-pol isolation testing and whatever other commissioning the NOC asks for. Read this procedure thoroughly before you are asked to begin. Assume that you are on the correct satellite and have RX network lock. (the NOC may have you adjust TX Frequency and/or modem TX level prior to beginning cross-pol isolation). At the appointed time follow the steps below for the cross-pol isolation testing.

15.1. Optimizing Cross-Pol Isolation

1. Access the Tools - Position Antenna screen.

NOTE: You will use Skew to optimize polarization because it drives the feed immediately (Linear Offset is slower, longer term drive).

2. Record the value in the Skew field in the upper section of the screen. If this satellite has a known Skew, it will be entered in the satellite configuration displayed here. If this satellite is not skewed this field will be 0.0.
3. While talking to the technician at the NOC make adjustments to the Skew value to adjust polarity of the feed under his/her direction (minus values are accepted – type a minus sign before the number value). It is best to adjust in one degree increments to get close to best isolation and then half degree steps and then tenths as needed. Click “Submit” after each numeric change is typed in.
4. Record the DIFFERENCE in Skew value which was required to achieve optimum cross-pol isolation.
5. Set Skew back to the value recorded in step 2.

The screenshot shows the 'Position Antenna' configuration screen in the Sea Tel COM-HUB interface. At the top, there's a status bar with 'Status' (Disconnected), 'Modem' (Normal), and 'Locked'. Below this, a compass rose shows the antenna's orientation. The main section is titled 'Position Antenna' and contains fields for 'Longitude' (95.0 E), 'Frequency' (1234.567 MHz), 'Tx Polarity' (HORIZ), 'Band' (1), 'Skew' (0.0 deg), 'Search Pattern' (Sky Search), 'Reflector' (Primary), 'Secondary' (Copol), 'Threshold' (Auto mode On), 'Auto offset' (143), and 'Threshold' (100). There are 'Submit' and 'Save' buttons. Below this, the 'Advanced Operations' section includes 'Parameters' (AZ Target 0.0 deg, EL Target 0.0 deg, CL Target 0.0 deg) and 'Operations' (Polang Target, Drive AUTO, Linear 0.0 deg, Circular 0.0 deg). There are also 'Search', 'Track', and 'Tx Mute' buttons.

6. Access the Reflector Configuration screen.
7. Change the “Linear Offset” value by the amount of difference recorded in step 4.

Examples:

Skew was 0.0, you increased it to 2.5 to optimize TX polarization. You set Skew back to zero and go to the Reflector Configuration screen where you find Linear Offset to be 0.0, so you increase Linear Offset to 2.5 degrees and click **Save**.

Skew was 3.0, you decrease it to 1.0 to optimize TX polarization. You set Skew back to 3.0 and go to the Reflector Configuration screen where you find Linear Offset to be 0.0, so you set Linear Offset to minus 2 (-2.0) degrees and click **Save**.

The screenshot shows the 'Reflector Configuration' screen in the Sea Tel COM-HUB interface. At the top, there's a status bar with 'Status' (Disconnected), 'Modem' (Normal), and 'Locked'. Below this, a compass rose shows the antenna's orientation. The main section is titled 'Reflector Configuration' and contains fields for 'Trim' (EL 0.0 deg, CL 0.0 deg, AZ 0.0 deg), 'Tracking Sensitivity' (EL 50 %, AZ 50 %), 'Search' (Auto Search Enable, Increment 1.0 deg, Delay 50 sec, Scan Rate 2.0 deg/sec, Incline Limit 15.0 deg), and 'Advanced Settings' (LNB LO, Band 1, 10.000 GHz, 2 10.700 GHz, 3 11.300 GHz, 4 9.750 GHz). There are 'Auto Trim', 'Calculate', and 'Save' buttons.

8. Double check with the NOC to assure that cross-pol is still optimized. 9. Conduct any other testing as directed by the NOC (ie P1dB compression).	
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16. Codan LBUC Serial M&C Install & Operation

Below are general instructions only. Please refer to your Codan Manual for more detailed instructions, updated information and a complete list of commands.

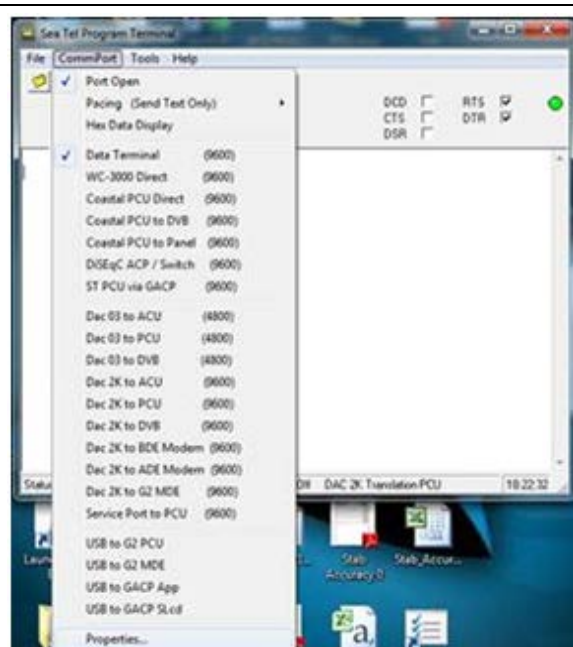
16.1. Cable Installation

1. Connect the DB-9 connector of the 138691-1 serial cable, to the Com Port of your computer.
2. Connect the RJ-45 connector to **J9 A** (only) serial connector on the rear panel of the MXP.

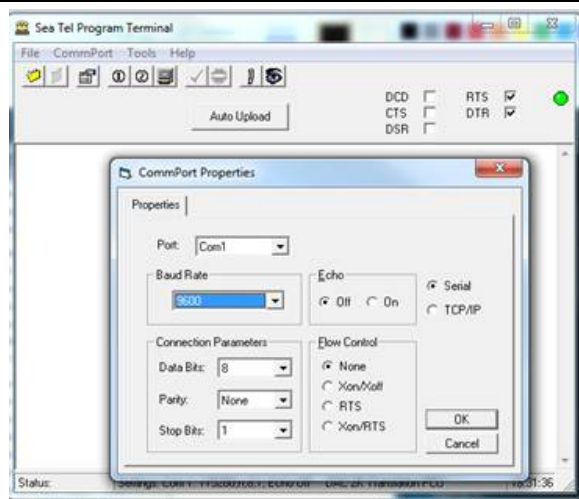
16.2. Communicating with the Codan LBUC

This procedure is based on ProgTerm, but HyperTerminal or similar program may be used.

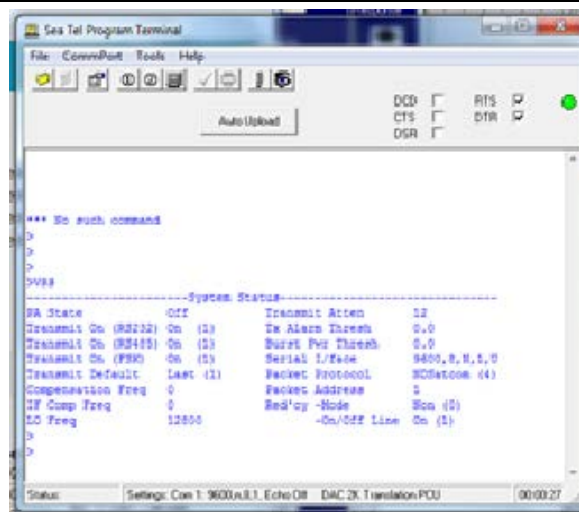
1. Open ProgTerm on the computer.
2. Click the "CommPort" tab.
3. Select "Properties".



4. Select **Serial**
5. Select **COM1**
6. Set Baud to **9600**
7. Set Data Bits to **8**
8. Set Parity to **None**
9. Set Stop Bit to **1**
10. Set Echo **OFF**
11. Set Flow Control to **None**
12. Click **OK**



13. Type VSS (hit return) to get status.
14. Type any other M&C commands as desired (refer to the Codan commands in their manual or type "HELP" for list of all commands available).



17. Stowing the Antenna

This antenna must be properly stowed if the ship will be underway while AC power to the Above Decks Equipment (ADE) is de-energized. Failure to do so may void your warranty.



CAUTION: There are three stow restraints that **MUST** be installed on this antenna pedestal if the ship will be underway while the Above Decks Equipment is de-energized.

It is strongly recommended that AC Power to the ADE and BDE be supplied from an adequately rated Un-interruptible Power Supply (UPS) to protect the antenna against short power outages while underway.

17.1. Installing the Stow Restraints

The order the restraints are installed is not critical.

17.1.1. Installing the AZ Shipping/Stow Restraint

1. The AZ shipping/stow restraint is formed by a pin bolt that is lowered into a channel in a stowage block on the upper plate of the pedestal (as shown).	
2. Remove the pin bolt from the "STOW" hole (this only stows the pin bolt, not the antenna). 3. Rotate the antenna to center the LOCK hole directly over the stow block channel. Pin bolt (this is the UN-Stowed position of the antenna) Stow Block Channel	
4. To restrain azimuth rotation of the antenna, install the pin bolt in the "Lock" hole and assure that the pin drops into the channel in the stow block below. 5. Verify that the stow pin is engaged in the channel of the stow block and that the antenna does NOT rotate in azimuth.	

17.1.2. Installing the EL Shipping/Stow Restraint

1. The EL shipping/stow restraint is formed by a stow pin-bolt mounted through a bracket and is engaged into a hole/slot in the elevation driven sprocket when the dish is at zenith (90 degrees elevation).
2. In the un-stowed position the hardware from left to right is the stow pin-bolt head, hex nut, washer, bracket, washer, hex nut. So the pin section of the stow pin-bolt is **NOT** inserted into the hole in the elevation driven sprocket.

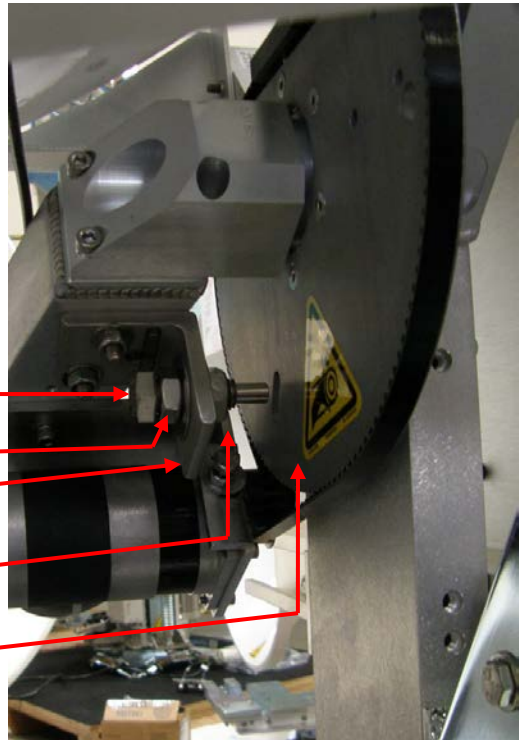
EL Stow Pin-Bolt head

Hex Nut & Washer

Bracket

Washer & Hex Nut

Elevation Driven Sprocket



3. To restrain the elevation axis of the antenna, unthread the hex nut nearest the elevation driven sprocket. Using a $\frac{3}{4}$ " open end wrench, remove the hex nut and washer from the stow pin-bolt.
4. Remove the stow pin-bolt from the bracket.



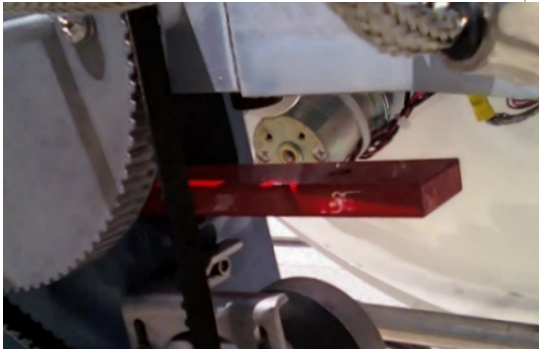
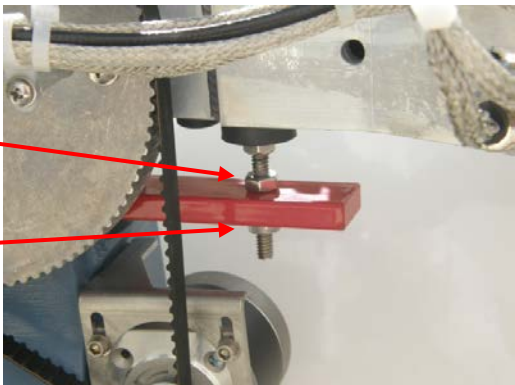
5. Remove the washer from the stow pin-bolt and unthread the hex nut from the bolt.
6. Put one of the washers onto the stow pin-bolt and insert it into the bracket toward the elevation driven sprocket.
7. Put the other washer, and then thread the two hex nuts onto the bolt.



8. Tighten the hex nuts to prevent the hardware from loosening while in the stowed configuration.
9. Verify that the antenna does not rotate in elevation.



17.1.3. Installing the CL Shipping/Stow Restraint

1. The CL shipping/stow restraint is formed by a red locking bar with adjustable bumpers at each end of the bar. This mechanism is placed under the cross-level beam to lock it in place (at level).	
2. If not already removed, remove an adjustable bumper by removing the bottom nut from one end of the locking bar. 3. If not already loosened, loosen the top nut up toward the rubber bumper. 4. Insert vacant end of the locking bar through the opening under the cross-level beam. 5. Insert the adjustable bumper into the vacant hole on the end of the locking bar.	
6. To restrain the cross-level axis of the antenna use a 7/16" open end wrench to tighten the nut on the top side of the locking bar until the rubber bumper is forced up against the bottom of the cross-level beam. 7. Verify that the antenna does NOT rotate (tilt left & right from level). 8. Re-install and tighten the bottom nut on the underside of the locking bar.	

17.2. Removing the Shipping/Stow Restraints PRIOR to Power-Up

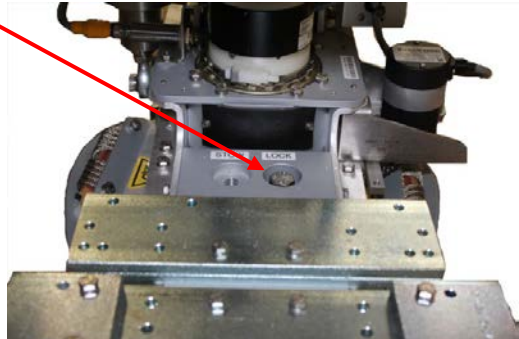
The order the restraints are removed is not critical.



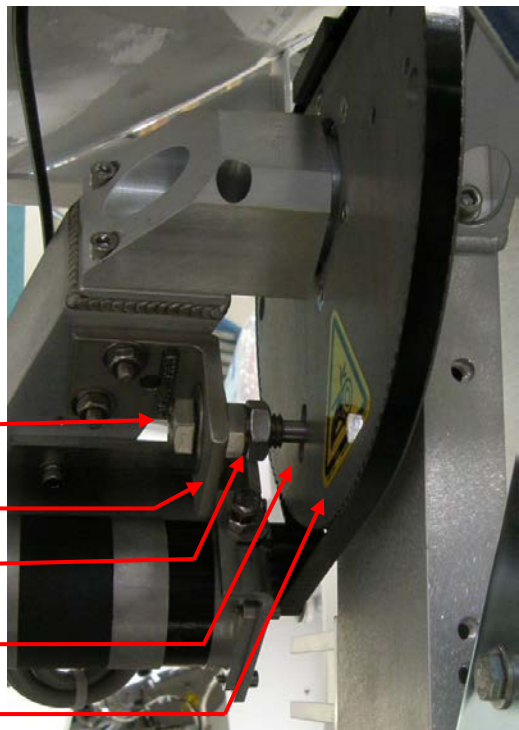
CAUTION: There are three shipping/stow restraints on this antenna pedestal that **MUST** be removed, **before energizing** the antenna, for normal operation.

17.2.1. Removing the AZ Shipping/Stow Restraint

1. The AZ shipping/stow restraint is formed by a pin bolt that is lowered into a channel in a stowage block on the upper plate of the pedestal (as shown).	
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2. To un-stow the antenna, remove the pin bolt from the LOCK position.	
3. Install the pin bolt into the STOW hole and tighten. This assures that it does not get lost and will be ready for re-use if the antenna needs to be stowed again at a later date. 4. Verify that the antenna is able to rotate freely in azimuth.	

17.2.2. Removing the EL Shipping/Stow Restraint

1. The EL shipping/stow restraint is formed by a stow pin-bolt mounted through a bracket and is engaged into a hole/slot in the elevation driven sprocket when the dish is at zenith (90 degrees elevation). 2. In the stowed position, the hardware from left to right is stow pin-bolt head, washer, bracket, washer, hex nut, hex nut so that the pin section of the stow pin-bolt is inserted into the hole in the elevation driven sprocket.	
EL Stow Pin-Bolt head	→
Bracket	→
2 Hex Nuts	→
Pin inserted into Elevation Driven Sprocket	→
Elevation Driven Sprocket	→

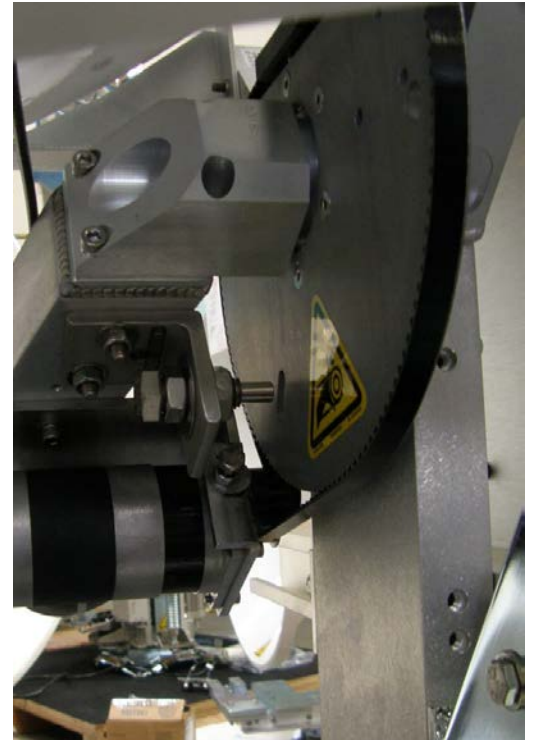
3. To un-restrain the elevation axis of the antenna, unthread the two hex nuts. Using a $\frac{3}{4}$ " open end wrench, remove the hex nuts and washer from the stow pin-bolt.
4. Remove the stow pin-bolt from the bracket.



5. Remove the washer from the stow pin-bolt and thread one of the two hex nuts onto the bolt and tighten.
6. Put one of the washers onto the stow pin-bolt and insert it into the bracket toward the elevation driven sprocket.
7. Put the other washer, and then the other hex nut onto the bolt.



8. Tighten the hex nut to prevent the hardware from loosening while in the un-stowed configuration.
9. Verify that the antenna rotates freely through its full elevation range of motion.



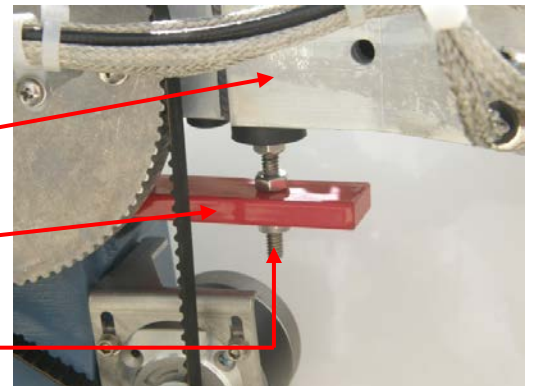
17.2.3. Removing the CL Shipping/Stow Restraint

1. The CL shipping/stow restraint is formed by a red locking bar with adjustable bumpers at each end of the bar. This mechanism is placed under the cross-level beam to lock it in place.

Cross-Level Beam

CL Shipping/Stow bar

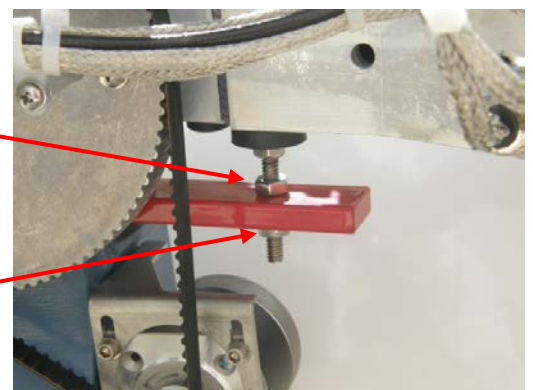
Adjustable CL Locking Bumpers (only one end shown)



2. To un-restrain the cross-level axis of the antenna use a 7/16" open end wrench to loosen the nut on the top side of the locking bar (either end of the bar).

3. Remove the bottom nut off of that adjustable bumper.

4. Remove the adjustable bumper from the locking bar.



5. Extract the locking bar from the underside of the cross-level beam and retain these parts for later re-use if it becomes necessary to stow the antenna. 6. Verify that the antenna rotates (tilts left and right from level) freely through its full cross-level range of motion.	
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18. 6012-33 Ku-Band Technical Specifications

The specifications of your antenna system are below. For Naval Engineering level information on this subject, please refer to Antenna Installation Guideline – Site Arrangement, document number 130040_A available on the Sea Tel Dealer Support Site.

18.1. Above Decks Equipment

System Weight (ADE)	
Weight	182.8 kg / 403lbs
Stabilized Antenna Pedestal Assembly	
Type	Three-axis (Level, Cross Level and Azimuth)
Stabilization	Torque Mode Servo / Two Axis W/Pol
Stability Accuracy	0.1° RMS, 0.2° peak in presence of specified ship motions (see below).
Azimuth Motor	Size 23 Brushless DC Servo, Double Stacked W/Encoder
Level Motor	Size 23 Brushless DC Servo W/Brake
Cross Level Motor	Size 23 Brushless DC Servo W/Brake
Inertial Reference	3 Solid State Rate Sensors
Gravity Reference	2 MEMS Tilt Sensors
AZ transducer	256 line optical encoder / home switch
Pedestal Range of Motion:	
Elevation Joint Angle	-15° to +115°
Cross Level (Inclined 30°)	+/- 35°
Azimuth	Unlimited
Elevation Pointing	10 to 90 degrees at 25 degrees roll
	5 to 95 degrees at 20 degrees roll
	0 to 100 degrees at 15 degrees roll
Relative Azimuth Pointing	Unlimited
Maximum Ship Motions	
Roll	+/-25° at 8-12 sec periods
Pitch	+/-15° at 6-12 sec periods
Yaw	+/-8 degrees at 15-20 sec periods
Turning rate	Up to 12 deg/sec and 15 deg/sec/sec
Headway	Up to 50 knots
Heave	0.5G
Surge	0.2G
Sway	0.2G
Specified Ship Motion (for stability accuracy tests)	
Roll	+/- 20° at 8 second period
Pitch	10° Fixed
Relative Azimuth (Heading)	0, 45 and 90° with respect to roll input

Mounting Height	Sea Tel recommends you do not exceed tangential accelerations of 0.5G (See below chart)
Pedestal Mounting Height vs Roll Period @ 25 degrees of Roll amplitude	
Antenna Reflector Ku-Band	
Type	Spun Aluminum
Diameter	1.47 m / 58"
TX Gain	45.1 dBi @ 14.25 GHz
RX Gain	44 dBi @ 12.50 GHz
G/T (30° elevation, clear sky)	21.9 dB/k (In Radome, typical)
FCC Input Power Spectral Density Limitation	-14.0 dBW / 4 KHz
Minimum EIRP (TVRO)	NA
KU-band Feed	
Type	Center Focus Cassegrain feed with TX reject filter and Cross-Pol OMT
Port to Port Isolation (XPol)	> 120 dB
Port to Port Isolation (CoPol)	> 90 dB
Cross Pol Isolation	> 35 dB typical (30dB within 1dB contour)
Polarization	Linear w/motorized skew adjustment
Polarization Control	24 volt DC motor with pot feedback
Polarization Range of Motion	270 degrees
Receive Frequency Range	10.70 - 12.75 GHz
Transmit Frequency Range	13.75 - 14.50 GHz
Co-Pol Diplexer	
Type:	DPX75K-002
Common Port (to feed)	WR-75 Flange, 10.70-14.5 GHz
Transmit Output (from SSPB)	WR-75 Flange, 13.75-14.5 GHz
Receive Output (to Co-Pol LNB)	WR-75 Flange, 10.70-12.75 GHz
Co-Pol LNB	Refer to LNB spec

SMW Quad LNB	
Band 1	
Voltage Required	13VDC
Input RF Frequency	10.95-11.70 GHz
Local Oscillator Frequency	10.00 GHz
Output IF Frequency	950 to 1700 MHz
Band 2	
Voltage Required	13VDC + 22 KHz Tone
Input RF Frequency	11.70-12.25 GHz
Local Oscillator Frequency	10.75 GHz
Output IF Frequency	950 to 1500 MHz
Band 3	
Voltage Required	18 VDC
Input RF Frequency	12.25-12.75 GHz
Local Oscillator Frequency	11.30 GHz
Output IF Frequency	950 to 1450MHz
Band 4	
Voltage Required	18VDC + 22 KHz Tone
Input RF Frequency	10.70-11.70 GHz
Local Oscillator Frequency	9.75 GHz
Output IF Frequency	950 to 1950 MHz
KU-band TX Radio Package	
SSPB	Codan 8 or 16W LBUC 6908-W/E-48/EX-CE-NI (Alternate Options available upon request)
Output Flange	WR-75
Input Connector	Type N
RF Input Frequency Range	950 to 1700 MHz
RF Output Frequency Range	13.75-14.5 GHz
RF Output VSWR	1.5:1 max
RF Pout@ 1 dB GCP	39.0 dBm (8 Watt BUC)
Reference Frequency Level	-10 to +5 dBm
Reference Frequency	10 MHz ext
M&C Options	Ethernet, RS-232
Step attenuator	1db Increments
Alarms	Lock, Over Temp, Temperature
Power Supply (ADE / PCU / ICU)	
A/C Input Voltage	85-264 VAC, 47-63Hz, single phase
Voltage	48VDC [24 VDC, 150W (QTY 2)]
Wattage	300W (total)
Current Capacity	13.0A (total)
Power Supply (BUC)	
A/C Input Voltage	85-264 VAC, 47-63Hz, single phase
Voltage	48VDC
Wattage	300W
Current Capacity	7.0A

GPS (On Board)	
Waterproof	IPX7
Operating Temperature	-30°C to +60°C
Storage Temperature	-40°C to +60°C
Humidity	Up to 95% non-condensing or a wet bulb temperature of +35°C
Altitude	-304m to 18,000m`
Vibration	IEC 68-2-64
Shock	50G Peak, 11ms
Connector	RJ11
Input Voltage	
Min	4.75VDC
Typ	5.0VDC
Max	5.25VDC
NMEA output messages	GGA, GLL
Refresh Rate	1s
Integrated Control Unit (ICU)	
Connectors	
J1	SMA (F) - RXIF Input from LNB 1 (Cross-Pol)
J2	SMA (F) - RXIF Input from LNB 2 (Co-Pol)
J3	SMA (F) - RXIF Output To Rotary Joint
J4 B/A	Ethernet - RJ45 Serial M&C - A=Radio M&C, B=Pass through
J5	Mini USB Antenna M&C
J6	DE-9 (F) - Serial Console - Antenna Serial M&C
J7	DE-9 (F) - Serial Radio M&C
J8	RJ-11 (F) - GPS Antenna Input
J9	DE-15 (F) - Motor Control to MDE
J10	DE-25 (F) - Feed Harness Connection
J14	DE-9 (F) - Serial Pass through M&C
J16	F (F) - TXIF Output to BUC
J19	M16 (F) - Power Supply DC Voltage Output to BUC
J20	Modular AC Power Input Receptacle
Status LEDs	Diagnostic Status of the EoC
	Diagnostic Status of the ICU
AC Input Power	85-264 VAC, 47-63Hz, single phase, 2A-1A
Coax Switch	
LNB-A (J1)	SMA (F)
LNB-B (J2)	SMA (F)
Rotary Joint (J3)	SMA (F)
Controls	Configurable from GUI

Integrated SCPC Receiver	
Tuning Range	950 to 1950 MHz in 1 KHz increments
Input RF Level	-85 to -25dBm typical
Output RF Level	Input level +/- 1dB typical
Sensitivity	30mV/dB typical (25 counts/dB typical)
Bandwidth (3dB)	150 KHz
Interfaces	
Modem/MXP M&C Interface	OpenAMIP & Legacy
Network Interface	4-port managed fast Ethernet switch
User Interface	Web Browser/Console Port
Motor Driver Enclosure	
Connectors	
Drive	DA-15P
Home	DE-9S
Az	DA-15S
EL	DA-15S
CL	DA-15S
Status LEDs	
CL Drive	Yes
EL Drive	Yes
Az Drive	Yes
MDE Status	Yes
ADE-BDE Interface Connections	
Dual Channel Rotary Joint	SMA (F) x 2
Power Requirements	
ADE	85-264 VAC, 47-63Hz, single phase, 450 Watts MAX (brake release, pedestal drive and BUC drive)
Radome Assembly (76 Inch)	
Type	Frequency Tuned
Material	A sandwich
Size	
Diameter	1.93 m / 76" (2.01m max flange diameter)
Height	1.61 m / 63.44"
Hatch Size	X.XXm x X.XXm / XX" x XX" (min)
Weight	90.7 kg / 200 lbs
RF attenuation	Less than 0.2 dB @ 10.75-14.5 GHz dry
Wind:	Withstand relative average winds up to 56m/sec (125 MPH) from any direction.
Ingress Protection Rating	IP 56

Radome Assembly (81 Inch) w/ base frame	
Type	Standard
Material	DIVINYCELL H100
Size	
Diameter	2.05m / 80.8"
Height	1.9m / 75" W/O base frame
Base Frame Height	0.55m / 21.75 in
Overall Height	2.46m (96.9")
Hatch Size	
Radome Weight	158.76 Kgs / 350 lbs
Base Frame weight	140.16 Kgs / 309 Lbs
RF attenuation	Typical 0.5 dB
Wind:	Withstand relative average winds up to 56m/sec (125 MPH) from any direction.
Ingress Protection Rating	IP 56
ADE Environmental Conditions	
Temperature Range (Operating)	-25° to +55° Celsius (-13° to +131° F)
Humidity	100% Condensing
Wind Speed	56 m/sec (125 mph)
Solar Radiation	1,120 Watts per square meter, 25° Celsius
Spray	Resistant to water penetration sprayed from any direction.
Icing	Survive ice loads of 4.5 pounds per square foot. Degraded RF performance will occur under icing conditions.
Rain	Up to 101.6mm (4 inches) per hour. Degraded RF performance may occur when the radome surface is wet.
Corrosion	Parts are corrosion resistant or are treated to endure effects of salt air and salt spray. The equipment is specifically designed and manufactured for marine use.

Mechanical Conditions	
Systematic Vibration	
Amplitude (single peak)	5.0 millimeters
Acceleration	2.0 G (20m/s ²)
Frequency Range	1Hz - 150Hz
Shock (Transient Vibration)	
Response Spectrum	I - II - III
Peak Accel., m/s ²	100 - 300 - 500
Duration, ms	11 - 6 - 3
Number of Cycles	3 each direction
Directional Changes	6
Shock (Bump)	
Peak Accel., m/s ²	250
Duration, ms	6
Number of Cycles	100 ea. direction
Directional Changes	6
Transit Conditions	
Drop (Transit Shock)	Complies with ISTA Standard
Chemically Active Substances	
Environmental Condition	Test Level
Sea Salt	5 percent solution

18.2. Below Decks Equipment

Media Xchange Point (MXP)	
Standard 19 Inch Rack mount	One Unit High
Physical Dimensions	17 X 17 X 1.75 (Inches)/ 43.18 x 43.18 x 4.45 (cm)
Input Voltage	85-264 VAC, 47-63Hz, single phase, 110 Watts
Weight	6.6lbs/ 3.0 kgs
Front Panel	
	4 Modem LEDs (On the MXP Board)
	2 MXP status LEDs
Rear Panel Connections	
AC Input	Modular AC Power Input Receptacle
J1	SMA (F) - RXIF Output to Satellite Modem
J2	SMA (F) - RXIF Input from ADE
J3 B/A	Ethernet - 2 ports of the 4 Port 10/100 Ethernet Switch 10.1.1.100
J4 B/A	Ethernet - 2 ports of the 4 Port 10/100 Ethernet Switch 10.1.1.100
J5	SFP Gigabit Ethernet
J6	Mini USB Antenna M&C
J7	USB Host (Type A) - N/C - Future Development
J8	DE9 (F) - Serial Console - Antenna Serial M&C
J9 A/B	RJ45 Serial M&C - A=Radio M&C, B=Pass through
J10 C/D	RJ45 Serial M&C - C=Modem, D=OBM
J11	Terminal Strip - Gyro Compass (SBS-Synchro) Interface Terminals
J12	Terminal Strip - Auxiliary Interface Terminals
J13	DE-9 (M) - NMEA 0183 Interface Port
J14	DE-9 (M) - AUX (RS-232) Interface Port
J15	NMEA 2000 Interface Port - Future Development
Gyro Compass Interface	
Connections	Plug-in Terminal Strip
Pin 1	Synchro R1
Pin 2	Synchro R2
Pin 3	Synchro S1 / SBS A
Pin 4	Synchro S2 / SBS B
Pin 5	Synchro S3 / SBS C
Pin 6	SBS COM

Synchro Interface	
Connectors	5 screw terminal connections (Plug-In)
Input Voltage Level	36-110 VDC, 400 or 60 Hz
Synchro Ratios	1:1, 36:1, 90 or 180:1 and 360:1
Impedance	1M ohm
SBS Interface	
Connectors	4 screw terminal connections (Plug-In)
Input Voltage Level	20-90 VDC
Interface	Opto-isolated
Polarity	Auto switching
Ratio	6 steps per degree
Impedance	10K Ohm
Auxiliary Interface	
Connections	Plug-in Terminal Strip
Pin 1 - GND	Ground
Pin 2 - Aux IN1	Modem Lock Input 1
Pin 3 - Aux IN2	Modem Lock Input 2
Pin 4 - GND	Ground
Pin 5 - SW1	Modem Mute Output 1
Pin 6 - SW2	Modem Mute Output 2
Pin 7 - SW3A	Dry Contact set 1
Pin 8 - SW3B	Dry Contact set 1
Pin 9 - SW4A	Dry Contact set 2
Pin 10 - SW4B	Dry Contact set 2
External AGC (AUX Inputs)	
Connectors	2 screw terminal connections
Input Voltage Level	0-5 VDC
Impedance	30K Ohm
Control (Logic Sense can be reversed)	Low Level (<1.25VDC) = Modem Lock :: High Level (>1.25 VDC) = Modem Unlock
SW1 Blockage / TX Mute Output	
Connections	1 screw terminal connection (SW1)
Connections	1 screw terminal connection (SW2)
Control Level	Not Blocked or Not mispointed=OPEN circuit
	Blocked or mispointed=SHORT to ground
SW2 Blockage / TX Mute Output	
Connections	1 screw terminal connection (SW2)
Control Level	Not Blocked or Not mispointed=OPEN circuit
	Blocked or mispointed=SHORT to ground

Dry Contact Output Sets (SW3 A-B & SW4 A-B)	
Switched outputs	4.7K pull up or Pull Down
Current handling	Current sink of 0.5 amps max.
No Alarm State	Normally Open
Alarm State	Contact closure
NMEA 0183 Interface	
Connections	5 screw terminal connections (RXA+ /RXA- input, RXB+ / RXB- input, and TXA+ output)
Rx Sentence Format (GPS)	\$xxGLL,DDmm,mmmm,N,DDDmm.mmmm,W (UTC optional) (*CS optional)
Rx Sentence Format (Gyro)	Heading \$xxHDT,xxx.x
Tx Sentence Format (GPS)	\$GPGGA,0,DDmm,N,DDDmm,W (configurable)
NMEA string examples:	
RX:	
\$GPGLL,3800.4300,N,12202.6407,W,231110,A*32	
\$GPGGA,231110,3800.4300,N,12202.6407,W,2,08,1.2,40.0,M,-31.3,M,,*4A	
TX:	
\$GPRMC,231325,A,3800.4300,N,12202.6405,W,000.0,184.9,190412,014.1,E*67	
\$GPVTG,184.9,T,170.8,M,000.0,N,0000.0,K*74	
BDE Environmental Conditions	
Temperature	0 to 40 degrees C
Humidity	Up to 100% @ 40 degrees C, Non-Condensing

18.3. *Regulatory Compliance*

Regulatory Compliance	
Survival Shock and Vibration	IEC-60721, MIL-STD-901D
Operational Shock and Vibration	Operational: IEC-60945, Survival: IEC-60721 and MIL-STD 901D
	MIL-STD-167-1
EMI/EMC Compliance Ku-Band	ETSI EN 301 843-1 V1.4.1 (2004-06)
	ETSI EN 301 489-1 V1.4.1 (2002-08)
	ETSI EN 300 339 (1998-03)
	IEC EN 60945:1997
Satellite Earth Stations and System (SES)	ETSI EN 301 428-1 V1.3.1 (2006-02)
	ETSI EN 302 340 V1.1.1 (2006-04)
Safety Compliance	IEC EN 60950-1:2001 (1st Edition)
Environmental Compliance	RoHS
	Green Passport
FCC ESV Compliance C-Band	NA
FCC ESV Compliance Ku-Band	47 C.F.R. § 25.222
FCC ESV Compliance Ka-Band	NA
Options	Bluetooth

18.4. Cables

18.4.1. Antenna L-Band IF Coax Cables (Customer Furnished)

Due to the loss across the length of the RF coaxes at L-Band, Sea Tel recommends the following 50 ohm coax cable types (and their equivalent conductor size) for our standard pedestal installations. Type N male connectors installed on the cables MUST be 50 Ohm connectors for the center pin to properly mate with the female adapters we provide on the Base multiplexer panel and on the adapter bracket mounted inside the radome next to the breaker box.:

Run Length	Coax Type	Typical. Loss @ 1750Mhz	Shield isolation	Center Conductor Size	Installed Bend Radius	Tensile Strength
<100 ft	LMR-240	10.704 db per 100 ft(30.48 m)	>90db	0.056 In. (1.42 mm)	2.5 In. (63.5 mm)	80lb (36.3 kg)
up to 150 ft	LMR-400	5.571 db per 100 ft(30.48 m)	>90db	0.108 In. (2.74 mm)	4.0 in. (101.6 mm)	160lb (72.6 kg)
up to 200 ft	LMR-500	4.496 db per 100 ft(30.48 m)	>90db	0.142 In. (3.61 mm)	5.0 In. (127 mm)	260lb (118 kg)
Up to 300 ft	LMR-600	3.615 db per 100 ft(30.48 m)	>90db	0.176 In. (4.47 mm)	6.0 In. (152.4 mm)	350lb (158.9 kg)

19. DRAWINGS

19.1. 6012-33 Ku-Band Model Specific Drawings

Drawing	Title	
138339-601_C1	System, 6012-33 in 76" Radome	19-3
138339-610_C2	System, 6012-33 in 81" Radome	19-5
138203-2_C	System Block Diagram, xx12-33, Ku-Band	19-7
138204_A2	Antenna Schematic, xx12-33	19-10
137389_A2	Pedestal Schematic, xx12 33	19-11
138342-1_B2	General Assembly 6012-33	19-12
130387-1_A1	Mounting Assembly, Codan MiniBuc	19-15
138658-1_A	Mounting Assembly, ICU	19-17
130028-1_E	76" Radome Assembly, Tuned	19-19
125749_D	Installation Arrangement, 76" Radomes	19-22
130307-1_A3	81" Radome Assembly, Tuned	19-23
135164-1_B	Baseframe Assembly	19-26
125804_A1	Installation Arrangement, 81" Radomes	19-28
131226_A	Procedure, Radome Strain Relief Installation	19-29
134563-1_D	Below Decks Kit, MXP	19-35

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SINGLE LEVEL MFG BILL OF MATERIAL

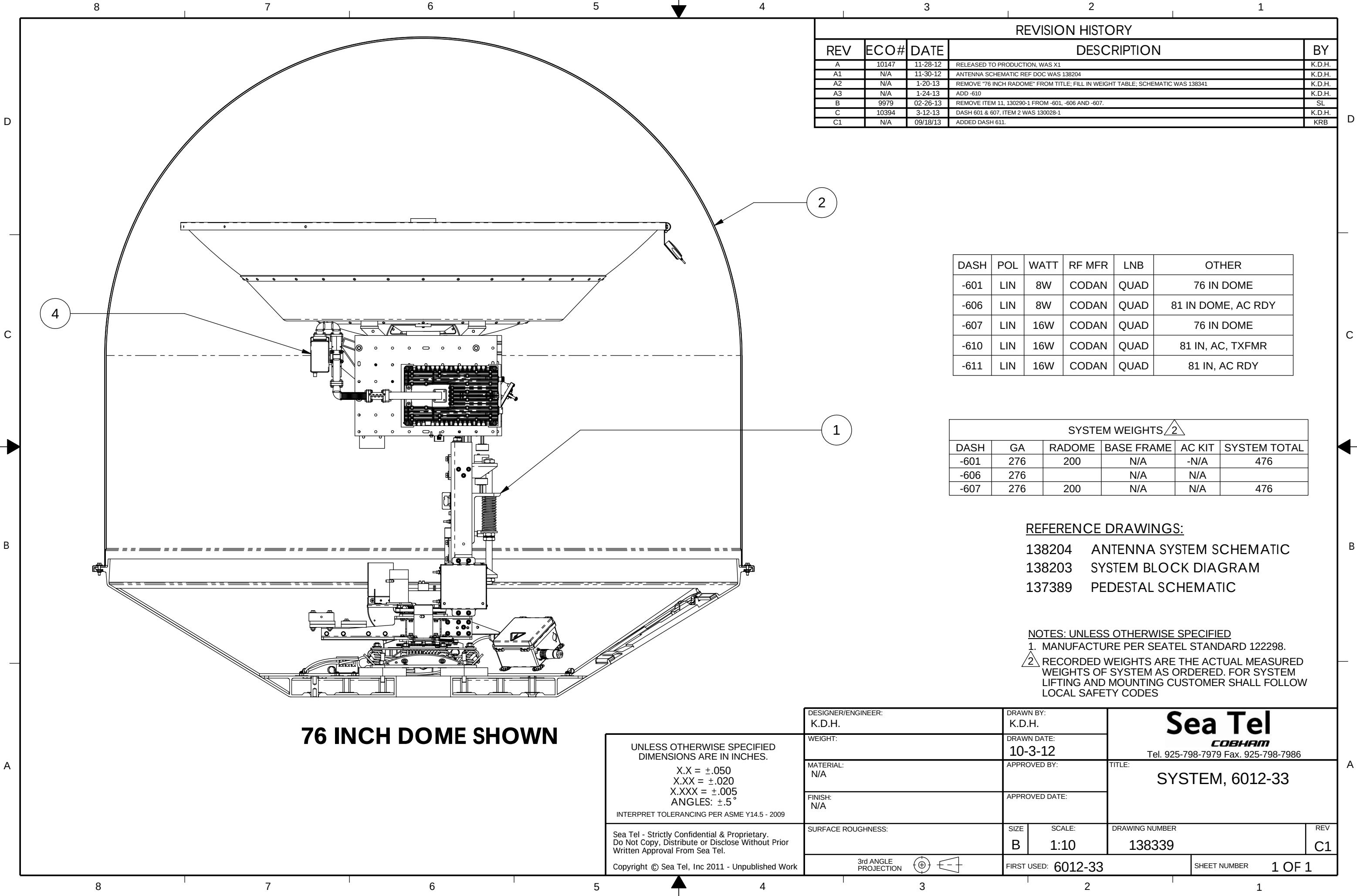
FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	138342-1	B2	GENERAL ASS'Y, 6012-33	
2	1 EA	133659-1	D	RADOME ASS'Y, GA INSTALL, 76 IN, WHIT	
3	1 EA	134442-4	A	SSPB, KU, CODAN LBUC, 8W NI, 48VDC, 6	
4	2 EA	136128-2	B	LNB, SMW, QUAD LO, KU BAND, TYPE N	
5	1 EA	134725-1	H	ENCLOSURE ASS'Y, MXP	(NOT SHOWN) ,
6	1 EA	134563-1	D	BELOW DECK KIT, MXP	(NOT SHOWN) ,
7	1 EA	130929-1	B	BALANCE WEIGHT KIT, FEED	(NOT SHOWN) ,
8	1 EA	137387-1	A	CUSTOMER DOC PACKET, SERIES 12 KU-BAN	(NOT SHOWN) ,
9	1 EA	124766-1	B	DECAL KIT, 66-81 IN RADOME, SEA TEL	(NOT SHOWN) ,
10	1 EA	121711	B	BALANCE WEIGHT KIT, BASIC, MEDIUM SYS	(NOT SHOWN) ,

				
SYSTEM, 6012-33, LIN, 8W, QUAD, 76 IN				
PROD FAMILY XX12	EFF. DATE 11/8/2013	SHT 1 OF 1	DRAWING NUMBER 138339-601	REV C1

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	138342-1	A	GENERAL ASS'Y, 6012-33	
2	1 EA	130307-1	A2	RADOME ASS'Y, 81 IN, TUNED, WHITE	
3	1 EA	134442-11	A	SSPB, KU, CODAN LBUC, 16W NI, 48VDC,	
4	2 EA	136128-2	B	LNB, SMW, QUAD LO, KU BAND, TYPE N	
5	1 EA	134725-1	E	ENCLOSURE ASS'Y, MXP	(NOT SHOWN) ,
6	1 EA	134563-1	B	BELOW DECK KIT, 4012GX (MXP)	(NOT SHOWN) ,
7	1 EA	130929-1	A4	BALANCE WEIGHT KIT, FEED	(NOT SHOWN) ,
8	1 EA	137387-1	A	CUSTOMER DOC PACKET, SERIES 12 KU-BAN	(NOT SHOWN) ,
9	1 EA	124766-1	B	DECAL KIT, 66-81 IN RADOME, SEA TEL	(NOT SHOWN) ,
10	1 EA	121711	A1	BALANCE WEIGHT KIT, BASIC, MEDIUM SYS	(NOT SHOWN) ,
11	1 EA	130290-1	B1	SHIP STOWAGE KIT, XX09	(NOT SHOWN) ,
12	1 EA	130291-1	C	RADOME BASE ASS'Y, 80.8 STEEL, W/ AC	
13	1 EA	123494-2	C	AIR CONDITIONER, R417A, 220VAC, DUAL	
14	1 EA	134070-1	A	FIELD INSTALLATION KIT, AC BUCK TRANS	

				
SYSTEM, 6012-33, LIN, 16W EXT NI, QUAD, 81 IN, AC, TXFMR				
PROD FAMILY XX12	EFF. DATE 2/20/2013	SHT 1 OF 1	DRAWING NUMBER 138339-610	REV A3



SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	138342-1	B2	GENERAL ASS'Y, 6012-33	
2	1 EA	127625-4	A5	ANTENNA INSTALLATION ASS'Y, 6009	
4	1 EA	128043-3	J	FEED ASS'Y, 6009, KU-BAND	
5	2 EA	136128-2	B	LNB, SMW, QUAD LO, KU BAND, TYPE N	
6	1 EA	134442-X		(REF ONLY) SSPB, KU, CODAN LBUC, NI,	
20	1 EA	132956-1	F	CIRCUIT BREAKER BOX ASS'Y, 6 AMP	
21	1 EA	134735-1	G	ENCLOSURE ASS'Y, ICU	
22	1 EA	131227-1	H	ENCLOSURE ASS'Y, MOTOR DRIVER, 09G2	
23	1 EA	121951-3	G	MOTOR, SZ 23, BLDC, 2 STK W/ ENCODER,	
24	2 EA	125644-1	J1	MOTOR, SIZE 23, BLDC W/ BRAKE, 15 PIN	
26	1 EA	131381-1	H	GPS ANTENNA, SERIAL, 118 INCH	
27	1 EA	129543-24	C	KIT, CABLE ASS'Y AND PROXIMITY SENSOR	
28	1 EA	131355-3	C4	POWER SUPPLY ASS'Y, 300W / 48V, CABL	
31	1 EA	129526-84	D	HARNESS ASS'Y, PCU TO MOTOR DRIVER, X	
32	1 EA	129527-36	B	HARNESS ASS'Y, MOTOR TO ELEVATION, 36	
33	1 EA	131493-1	A2	HARNESS ASS'Y, REFLECTOR, G2, XX09/XX	
34	1 EA	129741-84	D	HARNESS ASS'Y, 400MHZ MODEM TO CODAN	
40	1 EA	129254-3	B2	POWER RING, 20A, 3 CIRCUITS, WITH CON	
41	1 EA	138428-36	A	POWER CORD, IEC-60320-C14 TO DUAL IE	
42	1 EA	135832-84C	B	CABLE ASS'Y, AC POWER, SHIELDED, IEC	
44	1 EA	128536-84	B	CABLE ASS'Y, 48VDC TO CODAN SSPB, 84	
51	2 EA	114972-4	N1	CABLE ASS'Y, SMA(M) - SMA(M), 30 IN	
52	1 EA	114972-2	N1	CABLE ASS'Y, SMA(M) - SMA(M), 72 IN	
53	1 EA	123758-7	B2	CABLE ASS'Y, SMA(M)-N(M) 90 DEG, 7 FT	
55	1 EA	123758-6ORG	B2	CABLE ASS'Y, SMA(M)-N(M) 90 DEG, 6 FT	
56	1 EA	123758-6YEL	B2	CABLE ASS'Y, SMA(M)-N(M) 90 DEG, 6 FT	
60	2 EA	115492-1	C8	ADAPTER, N(F)-SMA(F), W/FLANGE	
61	1 EA	116466	G	ROTARY JOINT, 4.5 GHz, DUAL COAX.	

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SYSTEM BLOCK DIAGRAM, 6012-33

PROD FAMILY LIT	EFF. DATE 11/8/2013	SHT 1 OF 2	DRAWING NUMBER 138203-2	REV C
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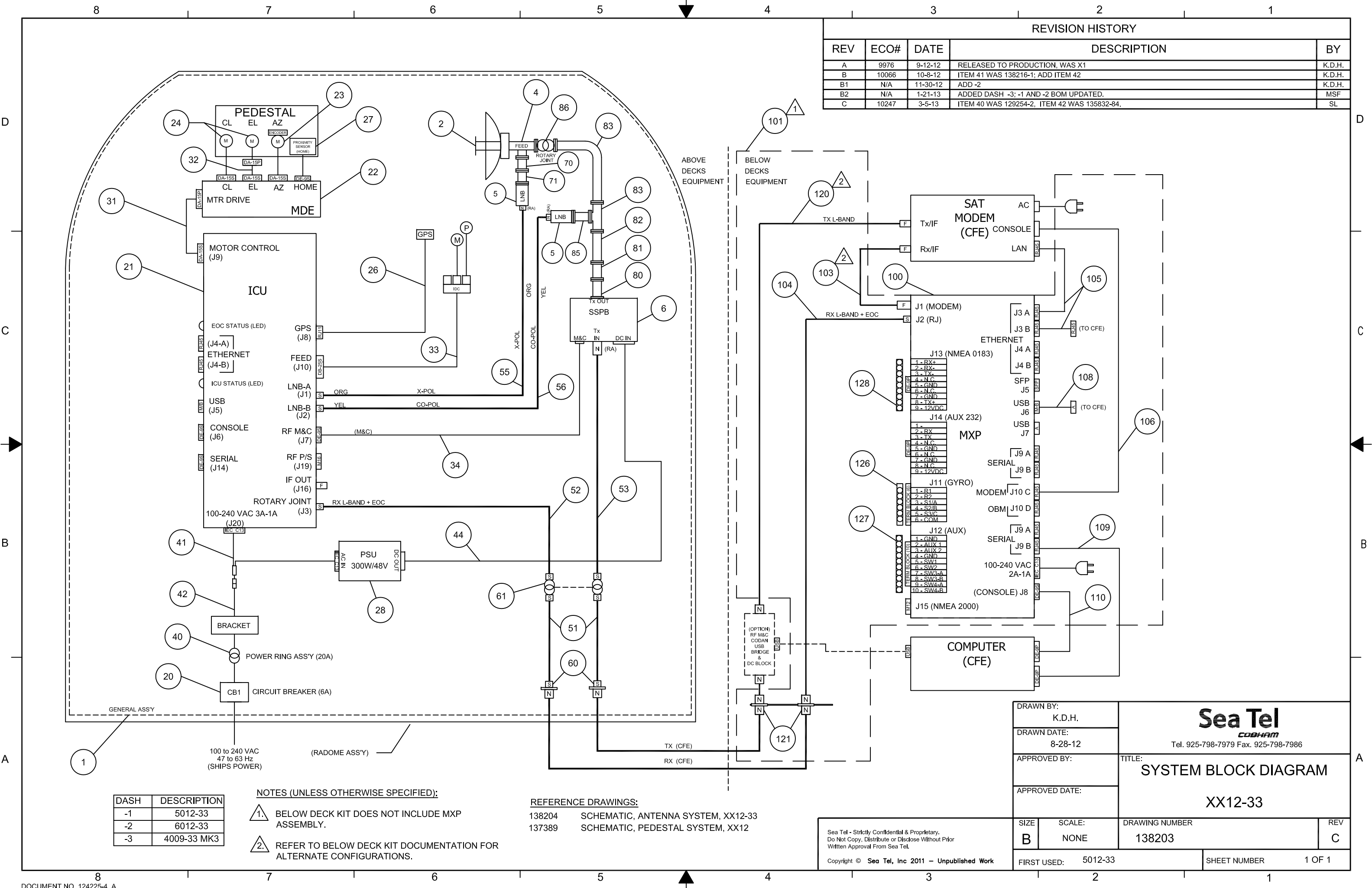
SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
70	1 EA	128059	B1	FILTER, TX REJECT, WR-75, 13.75-14.5	
71	1 EA	126144-1	D1	WAVEGUIDE, WR-75, 180 DEG E-BEND	
80	1 EA	127280-2	A2	WAVEGUIDE FILTER, KU-BAND, RX/REJECT,	
81	1 EA	128534-3	B	WAVEGUIDE, WR-75, H-BEND W/ FULL FLEX	
82	1 EA	110172-24	G1	WAVEGUIDE, WR-75, 90 DEG E-BEND, 3.86	
83	1 EA	125157-1	B	DIPLEXER, DPX75K-C02-A, WR-75	
84	1 EA	128716-1	A1	WAVEGUIDE, WR-75, KU BAND, 4006RZA	
85	1 EA	128290-1	A1	WAVEGUIDE, WR-75, 180 DEG H-BEND W/BR	
86	1 EA	115477-6	C	WAVEGUIDE, WR-75, ROTARY JOINT, L-STY	
100	1 EA	134725-1	H	ENCLOSURE ASS'Y, MXP	
101	1 EA	134563-1	D	BELOW DECK KIT, MXP	
103	1 EA	111115-6	C	CABLE ASS'Y, F(M)-F(M), 6 FT.	
104	1 EA	111079-6	H	CABLE ASS'Y, SMA(M)-N(M), 6 FT.	
105	2 EA	119479-10	C	CABLE ASS'Y, CAT5 JUMPER, 10 FT.	
106	1 EA	119478-5	E	CABLE ASS'Y, RJ-45 SERIAL, 60 IN.	
108	1 EA	133287-2	B	CABLE ASS'Y, USB 2.0, 6FT, A/M TO MIN	
109	1 EA	138691-1	A	CABLE ASS'Y, RJ45 TO DB9F, CISCO CONS	
110	1 EA	120643-25	C	CABLE ASS'Y, RS232, 9-WIRE, STRAIGHT,	
120	1 EA	116700-6	G	CABLE ASS'Y, RG223, N(M)-F(M), 6 FT.	
121	2 EA	110567-19	D	ADAPTER, N(F)-N(F), STRAIGHT, FLANGE	
126	1 EA	135689-6	B	CONN, PHOENIX, PLUGGABLE, TERM BLOCK,	
127	1 EA	135689-10	B	CONN, PHOENIX, PLUGGABLE, TERM BLOCK,	
128	1 EA	136897	C	CONNECTOR, DE9 (F) - TERM. BLOCK	

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SYSTEM BLOCK DIAGRAM, 6012-33

PROD FAMILY LIT	EFF. DATE 11/8/2013	SHT 2 OF 2	DRAWING NUMBER 138203-2	REV C
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REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	9976	9-12-12	RELEASED TO PRODUCTION, WAS X1	K.D.H.
B	10066	10-8-12	ITEM 41 WAS 138216-1; ADD ITEM 42	K.D.H.
B1	N/A	11-30-12	ADD -2	K.D.H.
B2	N/A	1-21-13	ADDED DASH -3: -1 AND -2 BOM UPDATED.	MSF
C	10247	3-5-13	ITEM 40 WAS 129254-2, ITEM 42 WAS 135832-84.	SL

DASH	DESCRIPTION
-1	5012-33
-2	6012-33
-3	4009-33 MK3

NOTES (UNLESS OTHERWISE SPECIFIED):

1. BELOW DECK KIT DOES NOT INCLUDE MXP ASSEMBLY.
2. REFER TO BELOW DECK KIT DOCUMENTATION FOR ALTERNATE CONFIGURATIONS.

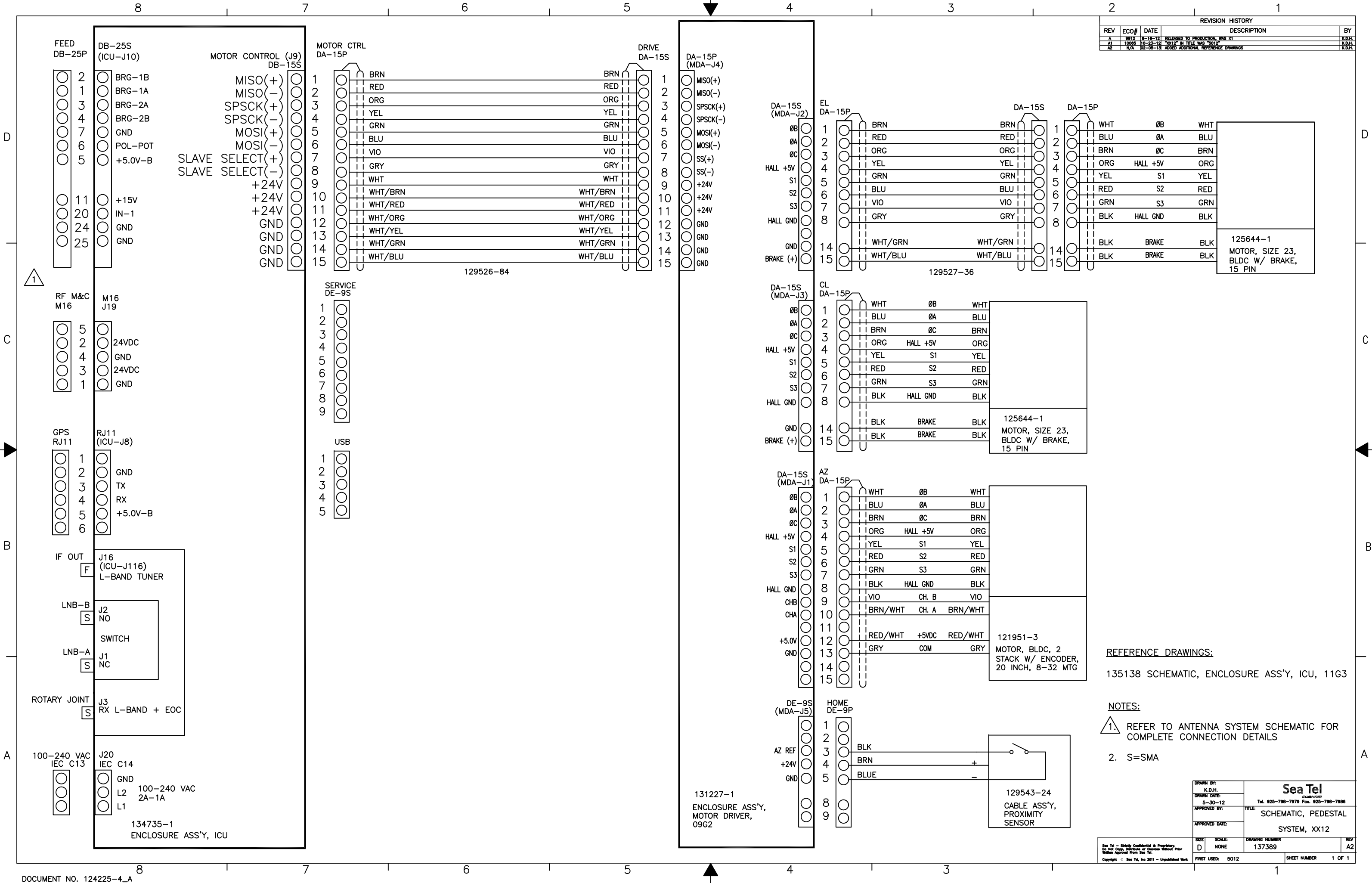
REFERENCE DRAWINGS:

- 138204 SCHEMATIC, ANTENNA SYSTEM, XX12-33
- 137389 SCHEMATIC, PEDESTAL SYSTEM, XX12

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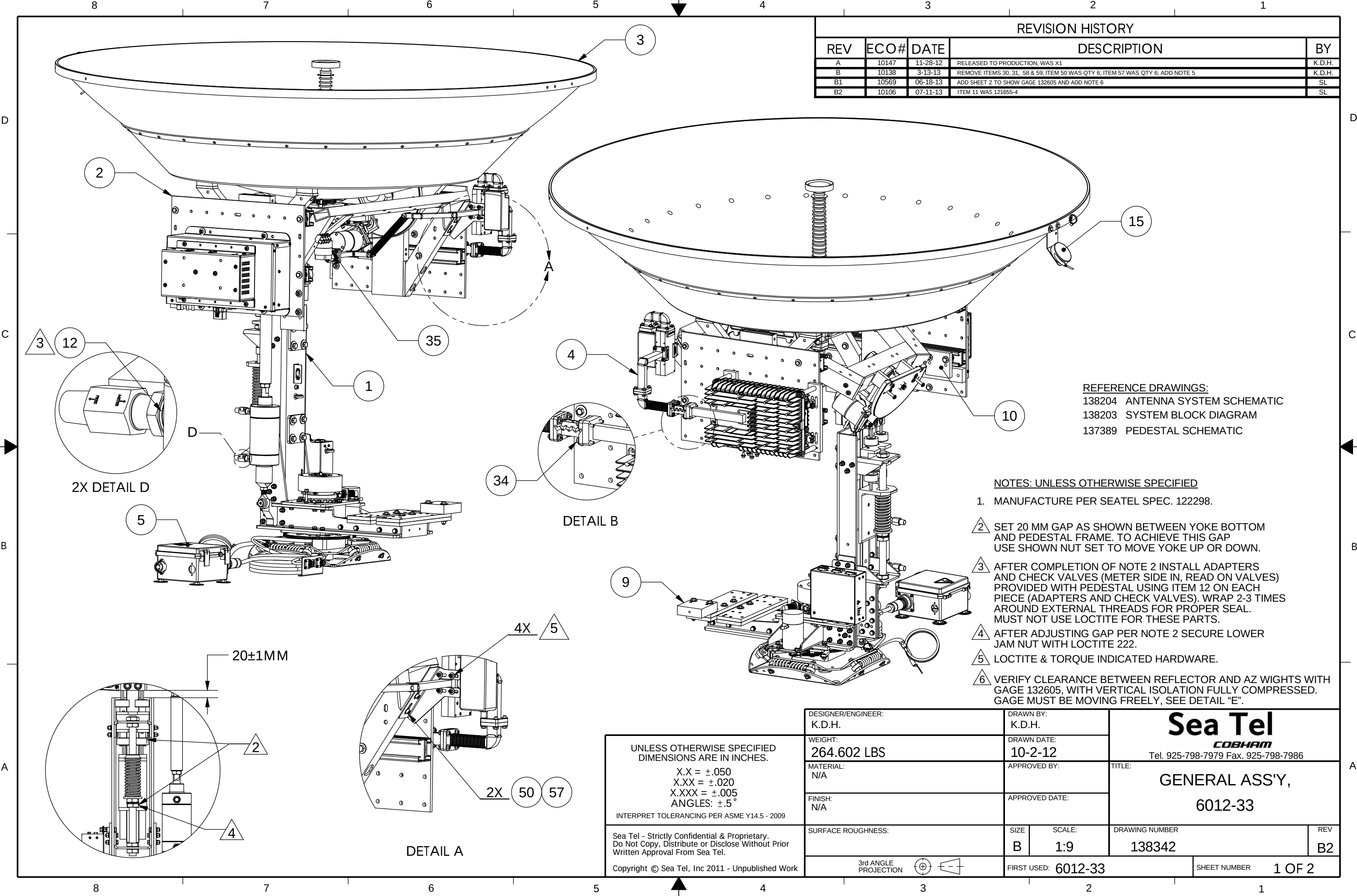
DRAWN BY: K.D.H.		Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
DRAWN DATE: 8-28-12			
APPROVED BY:			
APPROVED DATE:		TITLE: SYSTEM BLOCK DIAGRAM XX12-33	
SIZE B	SCALE: NONE	DRAWING NUMBER 138203	REV C
FIRST USED: 5012-33		SHEET NUMBER	1 OF 1



SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	138344-1	A1	PEDESTAL ASS'Y, 6012	
2	1 EA	138343-1	A1	ELECT. EQ FRAME ASS'Y, 6012-33	
3	1 EA	127625-4	A5	ANTENNA INSTALLATION ASS'Y, 6009	
4	1 EA	130396-1	A2	WAVEGUIDE ASS'Y, 60XX-33	
5	1 EA	135696-1	C	CIRCUIT BREAKER BOX, KIT, 6A	
9	1 EA	130294-1	B	BALANCE WEIGHT KIT, AZ, 6009	
10	1 EA	138348-1	A	BALANCE WEIGHT KIT, 6012-33	
11	1 EA	121655-4	J1	LABELS INSTALLATION, XX09	(NOT SHOWN) ,
12	12 IN	130043-12	A	TAPE, PIPE THREAD SEALANT, 1/2 IN WID	
15	1 EA	131645-1	B	INSTALL ASS'Y, GPS, NAVMAN, XX09/XX10	
30	2 EA	115998-2	J6	STRAP, RIGID WAVEGUIDE, KU-BAND	
31	1 EA	130808-1	A	BRACKET, WAVEGUIDE SUPPORT, XX09	
34	1 EA	118294-6	A3	HARDWARE KIT, WR-75, UG FLANGE, M4	
35	1 EA	118294-19	A1	HARDWARE KIT, WR-75, UG FLANGE, 6-32,	
50	6 EA	114593-164		SCREW, SOCKET HD, 10-32 x 1/2, S.S.	
57	6 EA	119952-011	A1	WASHER, STAR, INTERNAL TOOTH, #10, S.	
58	8 EA	114580-011		WASHER, FLAT, #10, S.S.	
59	4 EA	114583-011	A	NUT, HEX, 10-32, S.S.	

				
GENERAL ASS'Y, 6012-33				
PROD FAMILY XX12	EFF. DATE 2/20/2013	SHT 1 OF 1	DRAWING NUMBER 138342-1	REV A

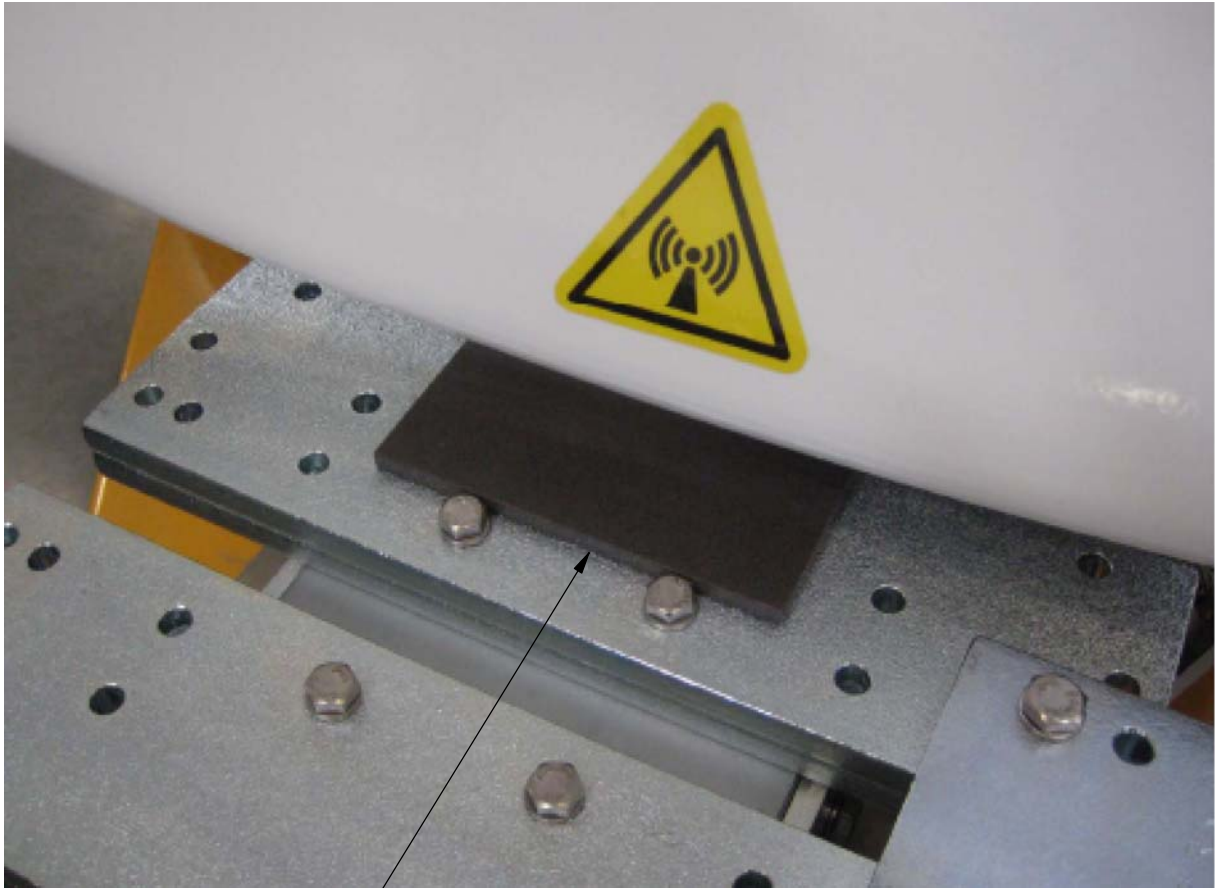


REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	10147	11-28-12	RELEASED TO PRODUCTION, WAS X1	K.D.H.
B	10138	3-13-13	REMOVE ITEMS 30, 31, 58 & 59; ITEM 50 WAS QTY 6; ITEM 57 WAS QTY 6; ADD NOTE 5	K.D.H.
B1	10569	06-18-13	ADD SHEET 2 TO SHOW GAGE 132605 AND ADD NOTE 6	SL
B2	10106	07-11-13	ITEM 11 WAS 121655-4	SL

REFERENCE DRAWINGS:
138204 ANTENNA SYSTEM SCHEMATIC
138203 SYSTEM BLOCK DIAGRAM
137389 PEDESTAL SCHEMATIC

- NOTES: UNLESS OTHERWISE SPECIFIED
- 1. MANUFACTURE PER SEATEL SPEC. 122298.
 - 2 SET 20 MM GAP AS SHOWN BETWEEN YOKE BOTTOM AND PEDESTAL FRAME. TO ACHIEVE THIS GAP USE SHOWN NUT SET TO MOVE YOKE UP OR DOWN.
 - 3 AFTER COMPLETION OF NOTE 2 INSTALL ADAPTERS AND CHECK VALVES (METER SIDE IN, READ ON VALVES) PROVIDED WITH PEDESTAL USING ITEM 12 ON EACH PIECE (ADAPTERS AND CHECK VALVES). WRAP 2-3 TIMES AROUND EXTERNAL THREADS FOR PROPER SEAL. MUST NOT USE LOCTITE FOR THESE PARTS.
 - 4 AFTER ADJUSTING GAP PER NOTE 2 SECURE LOWER JAM NUT WITH LOCTITE 222.
 - 5 LOCTITE & TORQUE INDICATED HARDWARE.
 - 6 VERIFY CLEARANCE BETWEEN REFLECTOR AND AZ WIGHTS WITH GAGE 132605, WITH VERTICAL ISOLATION FULLY COMPRESSED. GAGE MUST BE MOVING FREELY, SEE DETAIL "E".

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5 - 2009 Sea Tel - Strictly Confidential & Proprietary. Do Not Copy, Distribute or Disclose Without Prior Written Approval From Sea Tel. Copyright © Sea Tel, Inc 2011 - Unpublished Work	DESIGNER/ENGINEER: K.D.H.	DRAWN BY: K.D.H.	Sea Tel <i>COBHAM</i> Tel. 925-798-7979 Fax. 925-798-7986	
	WEIGHT: 264.602 LBS	DRAWN DATE: 10-2-12		
	MATERIAL: N/A	APPROVED BY:		
	FINISH: N/A	APPROVED DATE:	TITLE: GENERAL ASS'Y, 6012-33	
	SURFACE ROUGHNESS:	SIZE B	SCALE: 1:9	REV B2
3rd ANGLE PROJECTION		FIRST USED: 6012-33	SHEET NUMBER	1 OF 2



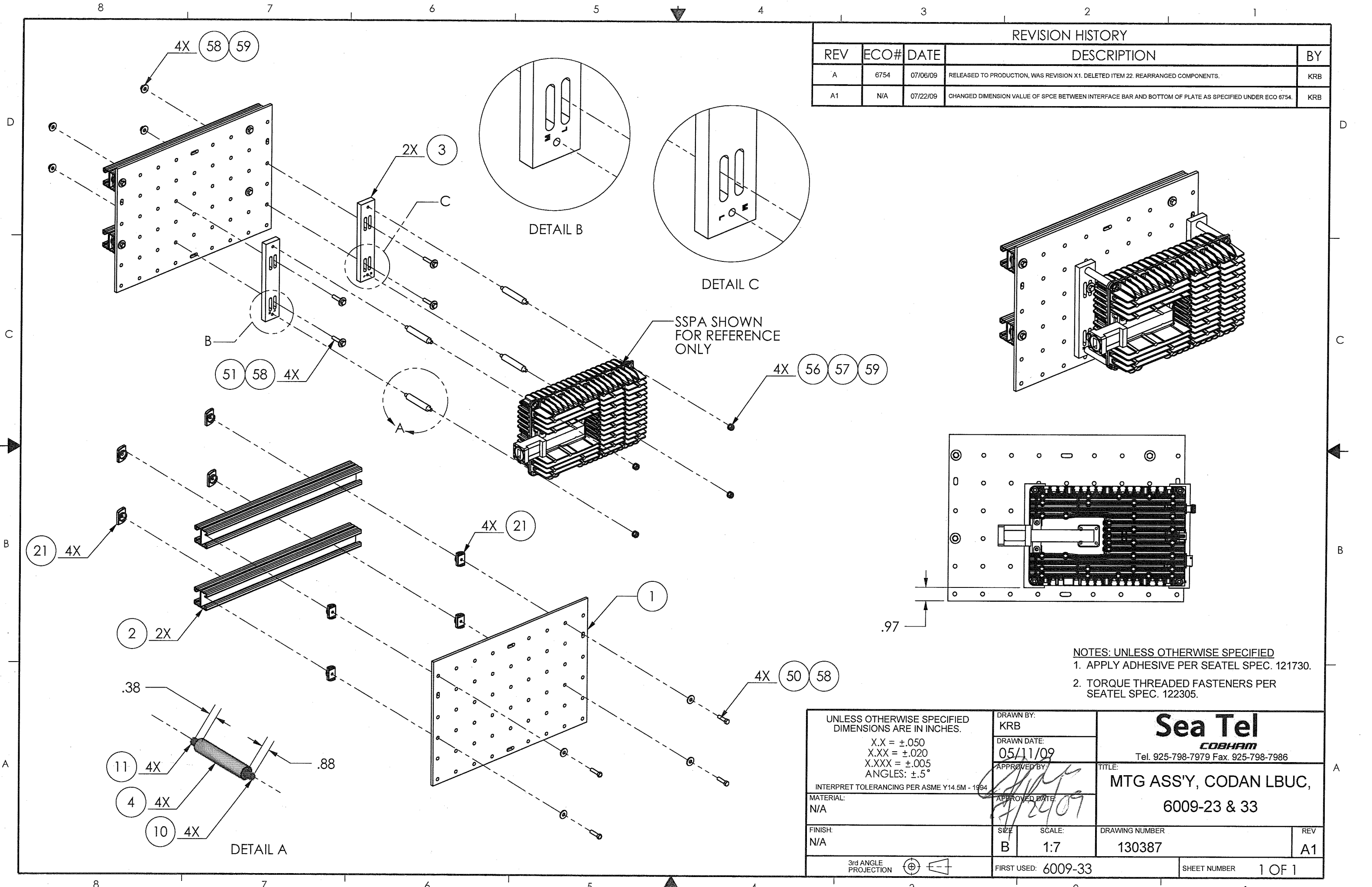
6 DETAIL "E"

SIZE	SCALE:	DRAWING NUMBER	REV
B	1:9	138342	B2
		SHEET NUMBER	2 OF 2

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	123861	B	MOUNTING PLATE	
2	2 EA	126288-17	B	UNISTRUT, 1-5/8 H-CHANNEL, 17 IN, AL	
3	2 EA	124716	B	RF INTERFACE, BAR, CODAN, BUC	
4	4 EA	118328-4	D	STANDOFF, RND, F/F, 1/4-20 X .5 OD X	
10	4 EA	114592-544		STUD, FULLY THREADED, 1/4-20 x 1-1/4,	
11	4 EA	114592-540		STUD, FULLY THREADED, 1/4-20 x 3/4, S	
21	8 EA	126279-3	A4	NUT, 1 5/8 UNISTRUT, 1/4-20, W/SPRING	
50	4 EA	114586-538		SCREW, HEX HD, 1/4-20 x 1, S.S.	
51	4 EA	114586-540		SCREW, HEX HD, 1/4-20 x 1-1/4, S.S.	
56	4 EA	114580-027		WASHER, FLAT, 1/4, SMALL PATTERN, S.S	
57	4 EA	114581-029		WASHER, LOCK, 1/4, S.S	
58	12 EA	114580-029		WASHER, FLAT, 1/4, S.S.	
59	8 EA	114583-029		NUT, HEX, 1/4-20, S.S.	

				
MOUNTING ASS'Y, CODAN LBUC, 6009-23/33				
PROD FAMILY COMMON	EFF. DATE 11/30/2012	SHT 1 OF 1	DRAWING NUMBER 130387-1	REV A1



REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	6754	07/06/09	RELEASED TO PRODUCTION, WAS REVISION X1. DELETED ITEM 22. REARRANGED COMPONENTS.	KRB
A1	N/A	07/22/09	CHANGED DIMENSION VALUE OF SPCE BETWEEN INTERFACE BAR AND BOTTOM OF PLATE AS SPECIFIED UNDER ECO 6754.	KRB

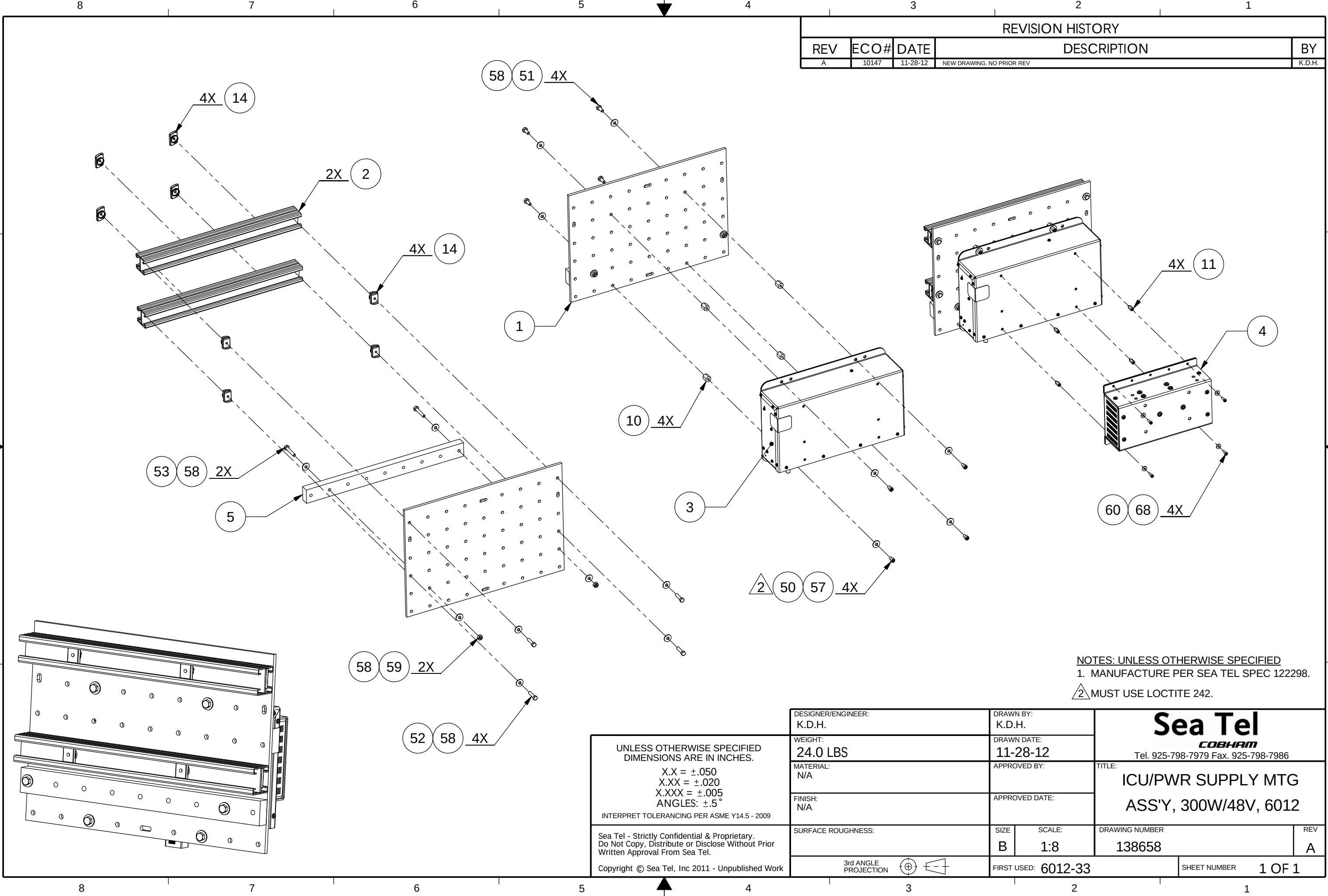
NOTES: UNLESS OTHERWISE SPECIFIED
1. APPLY ADHESIVE PER SEATEL SPEC. 121730.
2. TORQUE THREADED FASTENERS PER SEATEL SPEC. 122305.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994		DRAWN BY: KRB	Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
		DRAWN DATE: 05/11/09		
MATERIAL: N/A	APPROVED BY: <i>[Signature]</i> 07/24/09		TITLE: MTG ASS'Y, CODAN LBUC, 6009-23 & 33	
FINISH: N/A	SIZE: B	SCALE: 1:7	DRAWING NUMBER: 130387	REV: A1
3rd ANGLE PROJECTION			FIRST USED: 6009-33	SHEET NUMBER 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	123861	B	MOUNTING PLATE	
2	2 EA	126288-17	B	UNISTRUT, 1-5/8 H-CHANNEL, 17 IN, AL	
3	1 EA	134735-1	E2	ENCLOSURE ASS'Y, ICU	
4	1 EA	131355-3	C3	POWER SUPPLY ASS'Y, 300W / 48V, CABL	
5	1 EA	131374-1	A	WEIGHT, COUNTER, 1-1/2 X 3/4 X 17	
10	4 EA	124588-1021	A	STANDOFF, HEX, F/F, 1/4-20 X .50 OD X	
11	4 EA	131572-5321	A	STANDOFF, HEX, M/F, M4 X 14, BRASS W/	
14	8 EA	126279-3	A4	NUT, 1 5/8 UNISTRUT, 1/4-20, W/SPRING	
50	4 EA	114593-202		SCREW, SOCKET HD, 1/4-20 x 3/8, S.S.	
51	4 EA	114586-536		SCREW, HEX HD, 1/4-20 x 5/8, S.S.	
52	4 EA	114586-538		SCREW, HEX HD, 1/4-20 x 1, S.S.	
53	2 EA	114586-541		SCREW, HEX HD, 1/4-20 x 1-1/2, S.S.	
57	4 EA	114580-027		WASHER, FLAT, 1/4, SMALL PATTERN, S.S	
58	12 EA	114580-029		WASHER, FLAT, 1/4, S.S.	
59	2 EA	114583-029		NUT, HEX, 1/4-20, S.S.	
60	4 EA	119973-117		SCREW, SOCKET HD, M4 X 12, S.S.	
68	4 EA	114580-230		WASHER, FLAT, M4, S.S.	

				
ICU/PSU MOUNTING ASS'Y, 300W/48V, 6012				
PROD FAMILY COMMON	EFF. DATE 2/20/2013	SHT 1 OF 1	DRAWING NUMBER 138658-1	REV A



REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	10147	11-28-12	NEW DRAWING, NO PRIOR REV	K.D.H.

NOTES: UNLESS OTHERWISE SPECIFIED
1. MANUFACTURE PER SEA TEL SPEC 122298.
2 MUST USE LOCTITE 242.

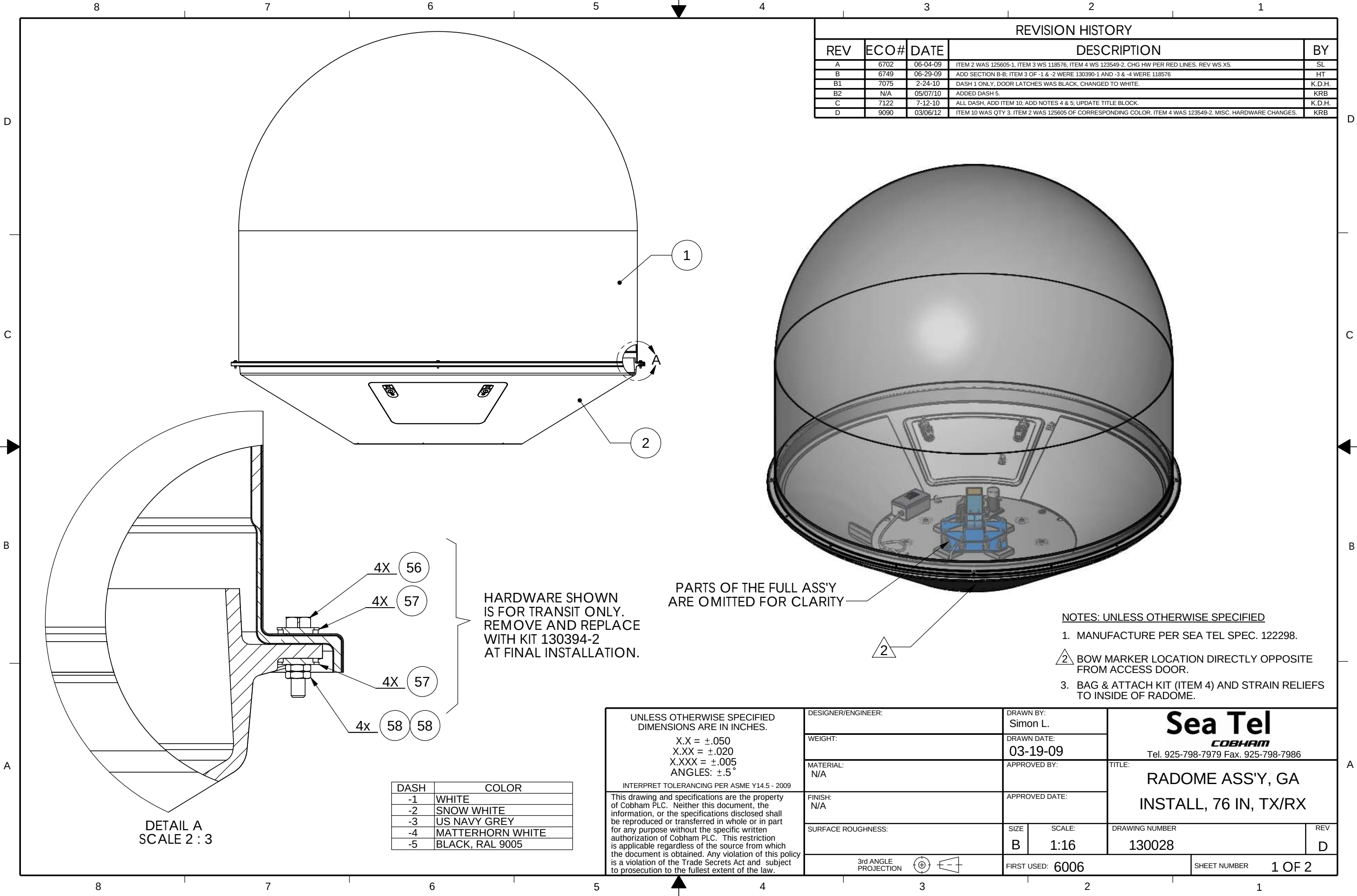
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
X.X = ±.050
X.XX = ±.020
X.XXX = ±.005
ANGLES: ±.5°
INTERPRET TOLERANCING PER ASME Y14.5 - 2009
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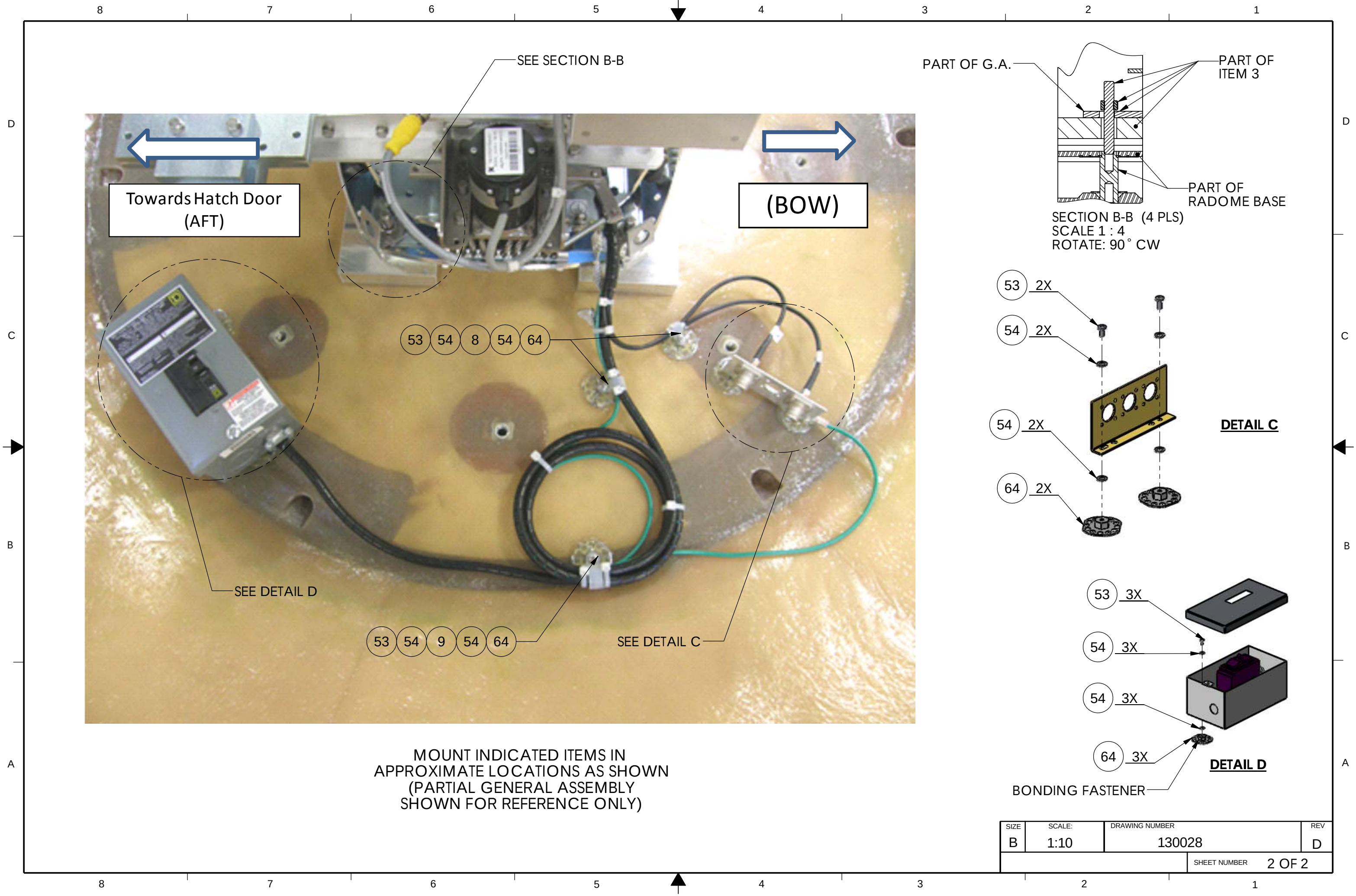
DESIGNER/ENGINEER: K.D.H.		DRAWN BY: K.D.H.		Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986 ICU/PWR SUPPLY MTG ASS'Y, 300W/48V, 6012	
WEIGHT: 24.0 LBS		DRAWN DATE: 11-28-12			
MATERIAL: N/A		APPROVED BY:			
FINISH: N/A		APPROVED DATE:		TITLE:	
SURFACE ROUGHNESS:		SIZE B	SCALE: 1:8	DRAWING NUMBER 138658	REV A
3rd ANGLE PROJECTION		FIRST USED: 6012-33			SHEET NUMBER 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	128652-1	A2	RADOME TOP FAB, 76 IN, WHITE	
2	1 EA	130395-1	A3	RADOME BASE ASS'Y, 76 IN, WHITE	
3	1 EA	130390-2	B	KIT, HARDWARE, GA TO RADOME, RAISED	
4	1 EA	130394-2	D	KIT, HARDWARE, RADOME TO MAST, 12-HOL	
5	4 EA	119801-012	B	CABLE TIE, NYLON, 4 IN, NATURAL	(NOT SHOWN) ,
6	7 EA	119801-019	B	CABLE TIE, NYLON, 7.5 IN, NATURAL	(NOT SHOWN) ,
7	1 OZ	125948-1	A	ADHESIVE, HOT MELT, 3M SCOTCH-WELD 37	(NOT SHOWN) ,
8	2 EA	111679-7	B	CABLE CLAMP, NYLON, .50 DIA, #8 MTG H	
9	1 EA	111679-25	B	CABLE CLAMP, NYLON, 3/4 DIA, #10 MTG	
10	5 EA	124903-1	B3	STRAIN RELIEF ASS'Y (CABLE GLAND)	(NOT SHOWN) ,
53	8 EA	119745-218		SCREW, PAN HD, PHIL, M4 x 8	
54	16 EA	114580-230		WASHER, FLAT, M4, S.S.	
56	4 EA	114589-141		SCREW, HEX HD M6X35	
57	8 EA	130371-170	A	WASHER, NYLON, 6.4 ID, 12 OD	
58	8 EA	120089-251		NUT, HEX, M6, S.S.	
64	8 EA	125806-7	A	ROTALOC HEX NUT, SS-1-B38-M4 X 07-6H	
101	1 EA	131412	A	CRATE, 76 IN RADOME, OD: 88 X 88 X 87	
102	1 EA	131469-1	A1	SHIPPING KIT, ASS'Y	

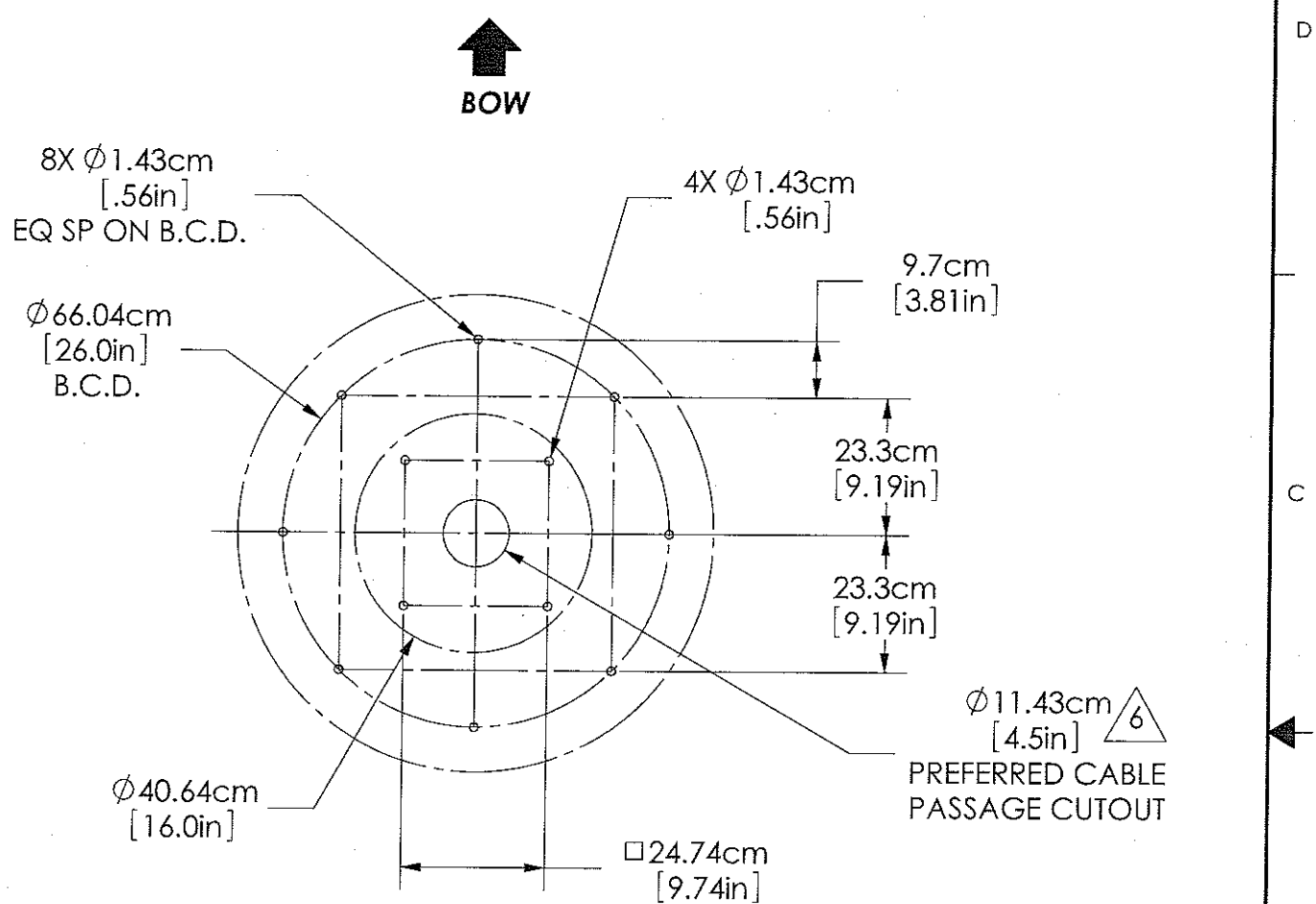
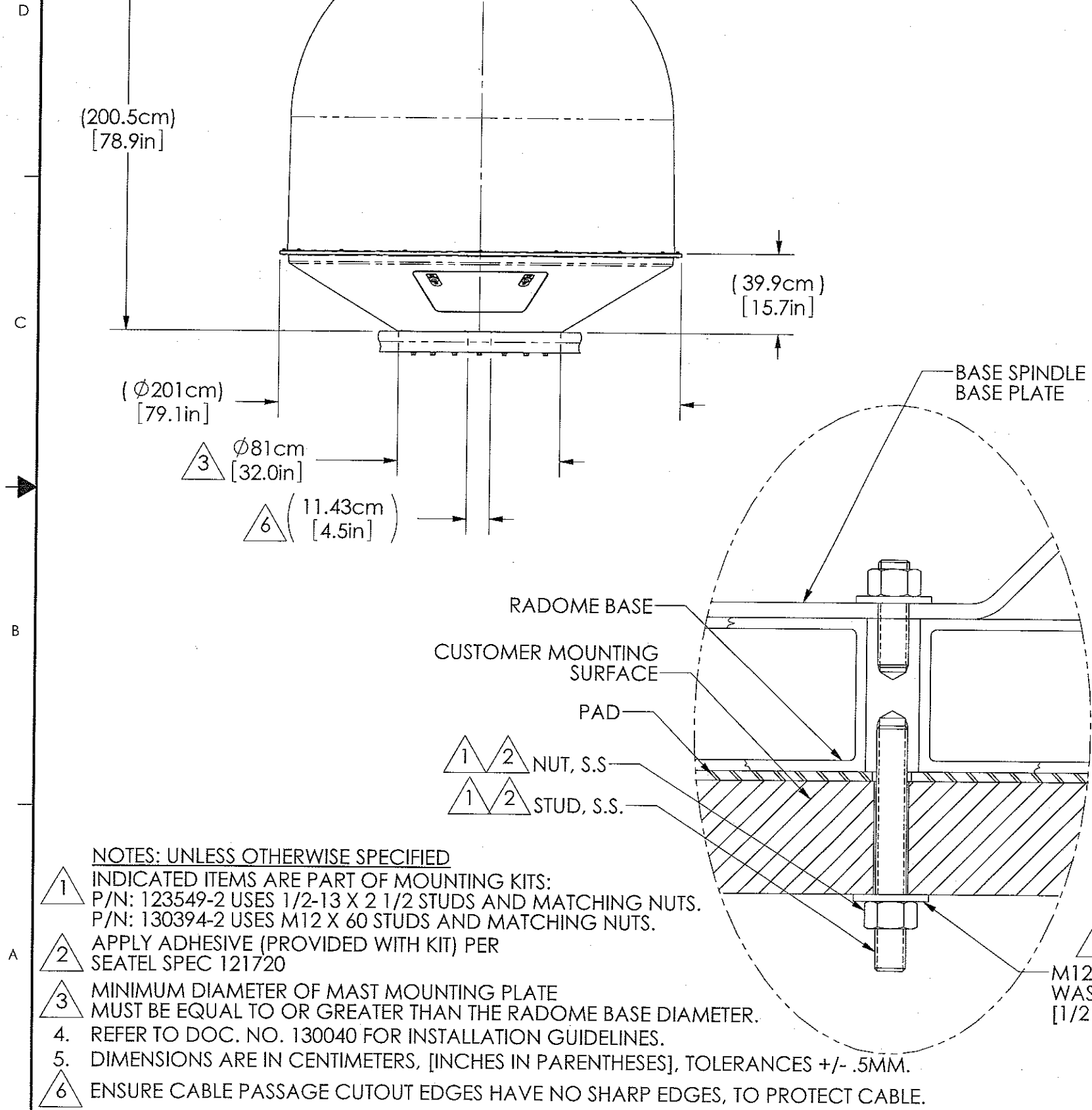
				
RADOME ASS'Y, GA INSTALL, 76 IN, TX/RX, WHITE				
PROD FAMILY COMMON	EFF. DATE 2/20/2013	SHT 1 OF 1	DRAWING NUMBER 130028-1	REV E





SIZE	SCALE:	DRAWING NUMBER	REV
B	1:10	130028	D
		SHEET NUMBER	2 OF 2

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	N/A	01-05-06	PRODUCTION RELEASE, WS X1.	LAE
B	6762	07-10-09	ADD METRIC VALUES TO ALL DIMENSIONS.	SL
C	N/A	09-17-09	ADDED NOTES 3-5; NOTE 1: ADDED 130394-2; REF DWGS: ADDED 126153, 130028, 130029; SECTION VIEW: ADDED PAD.	AMN
D	N/A	01-29-10	ADDED 4.5 IN DIA PREFERRED CABLE PASSAGE CUTOUT (ZONE C3); ADDED NOTE 6.	AMN



ALL HOLES MUST BE USED TO MOUNT THE ABOVE DECKS EQUIPMENT TO THE SHIP.

- REFERENCE DRAWINGS
- 125849 RADOME ASS'Y, GA INSTALL, 76-IN, TX/RX
 - 126153 RADOME ASS'Y, GA INSTALL, 76-IN, TVRO
 - 130028 RADOME ASS'Y, GA INSTALL, 76-IN, TX/RX
 - 130029 RADOME ASS'Y, GA INSTALL, 76-IN, TVRO

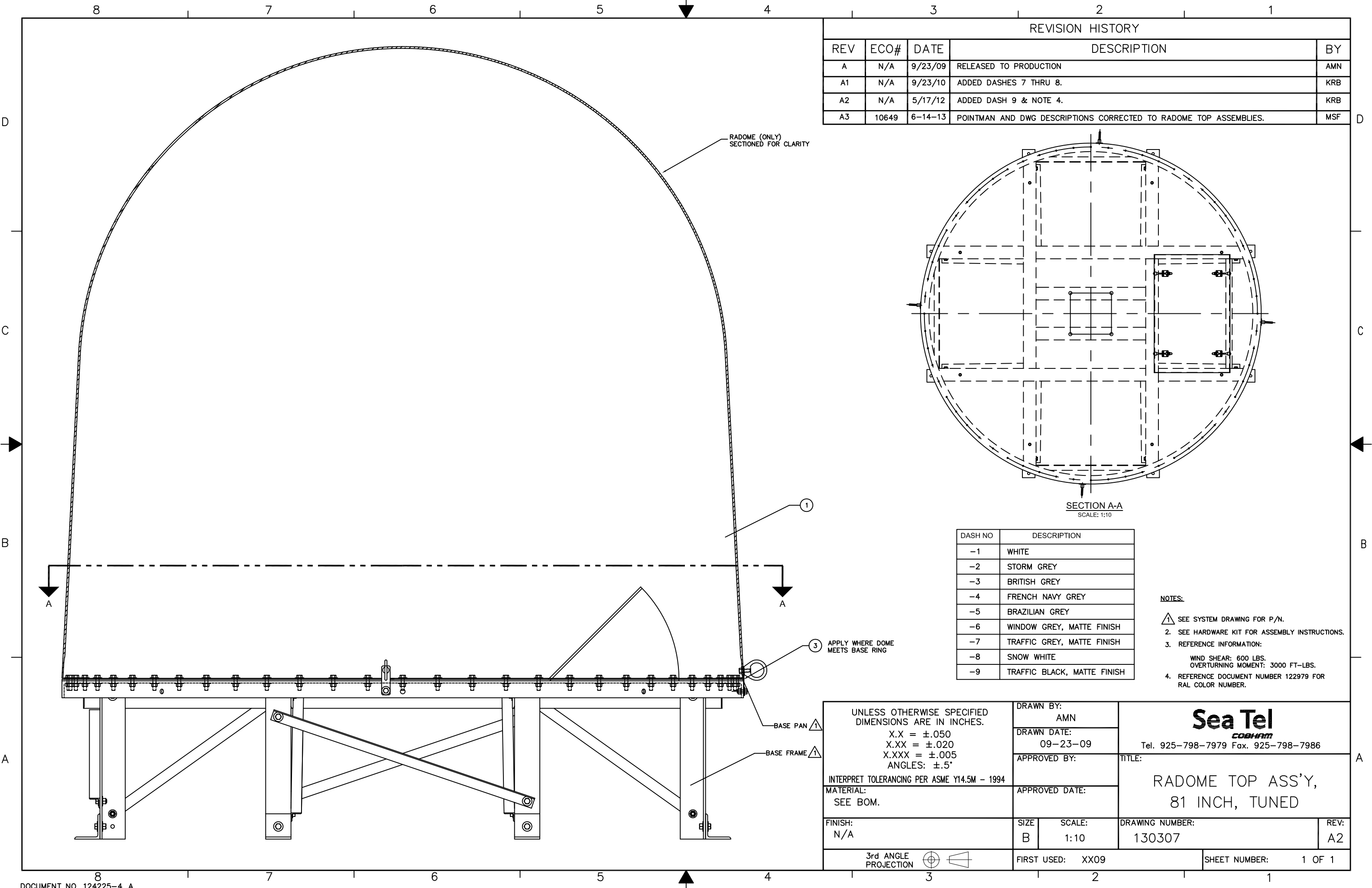
- NOTES: UNLESS OTHERWISE SPECIFIED
- INDICATED ITEMS ARE PART OF MOUNTING KITS:
P/N: 123549-2 USES 1/2-13 X 2 1/2 STUDS AND MATCHING NUTS.
P/N: 130394-2 USES M12 X 60 STUDS AND MATCHING NUTS.
 - APPLY ADHESIVE (PROVIDED WITH KIT) PER SEATEL SPEC 121720
 - MINIMUM DIAMETER OF MAST MOUNTING PLATE MUST BE EQUAL TO OR GREATER THAN THE RADOME BASE DIAMETER.
 - REFER TO DOC. NO. 130040 FOR INSTALLATION GUIDELINES.
 - DIMENSIONS ARE IN CENTIMETERS, [INCHES IN PARENTHESES], TOLERANCES +/- .5MM.
 - ENSURE CABLE PASSAGE CUTOUT EDGES HAVE NO SHARP EDGES, TO PROTECT CABLE.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5°		DRAWN BY: T PATEL		 Tel. 925-798-7979 Fax. 925-798-7986	
INTERPRET TOLERANCING PER ASME Y14.5M - 1994		DRAWN DATE: 12/19/06			
MATERIAL: N/A		APPROVED BY: 		TITLE: INSTALLATION ARRANGEMENT	
FINISH: N/A		APPROVED DATE: 1/29/2010		76-IN RADOME	
3rd ANGLE PROJECTION		SIZE: B	SCALE: 1:4	DRAWING NUMBER: 125749	REV: D
FIRST USED: 6006				SHEET NUMBER 1 OF 1	

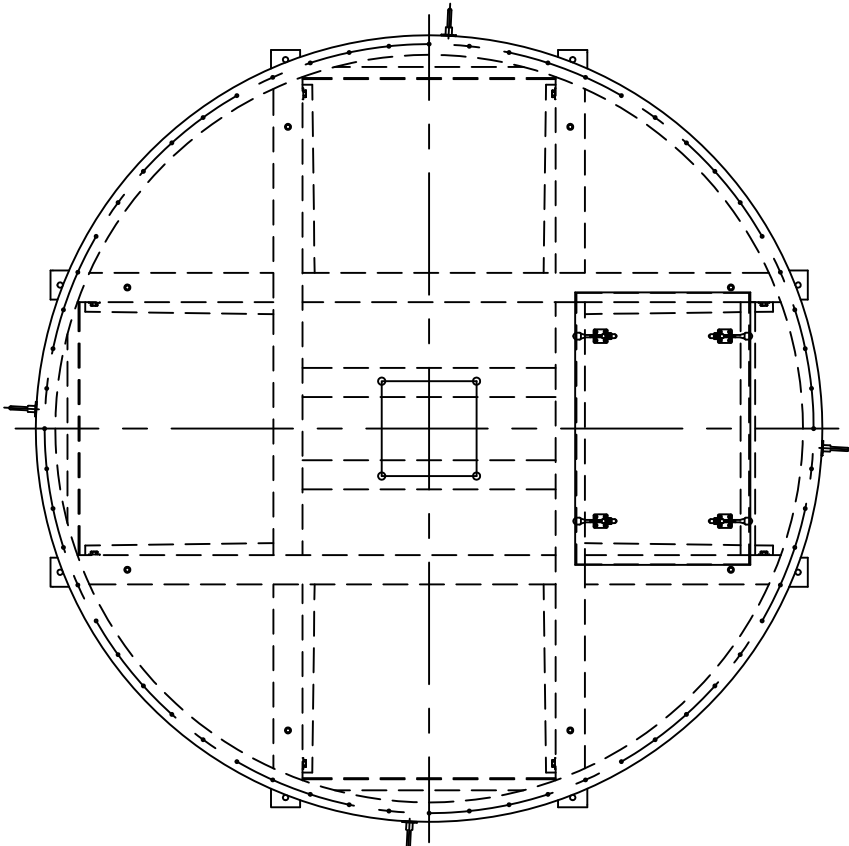
SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	130306-1	A4	RADOME TOP FAB, 81 IN, TUNED, WHITE	
2	1 EA	120881	A	HARDWARE KIT, 80.8 INCH RADOME	
3	3 EA	117762-1	B	SILICONE ADHESIVE, WHT RTV 122, 10.1	

Sea Tel <i>COBHAM</i>				
RADOME TOP ASS'Y, 81 IN, TUNED, WHITE				
PROD FAMILY COMMON	EFF. DATE 11/8/2013	SHT 1 OF 1	DRAWING NUMBER 130307-1	REV A3



REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	N/A	9/23/09	RELEASED TO PRODUCTION	AMN
A1	N/A	9/23/10	ADDED DASHES 7 THRU 8.	KRB
A2	N/A	5/17/12	ADDED DASH 9 & NOTE 4.	KRB
A3	10649	6-14-13	POINTMAN AND DWG DESCRIPTIONS CORRECTED TO RADOME TOP ASSEMBLIES.	MSF



DASH NO	DESCRIPTION
-1	WHITE
-2	STORM GREY
-3	BRITISH GREY
-4	FRENCH NAVY GREY
-5	BRAZILIAN GREY
-6	WINDOW GREY, MATTE FINISH
-7	TRAFFIC GREY, MATTE FINISH
-8	SNOW WHITE
-9	TRAFFIC BLACK, MATTE FINISH

- NOTES:
- SEE SYSTEM DRAWING FOR P/N.
 - SEE HARDWARE KIT FOR ASSEMBLY INSTRUCTIONS.
 - REFERENCE INFORMATION:
WIND SHEAR: 600 LBS.
OVERTURNING MOMENT: 3000 FT-LBS.
 - REFERENCE DOCUMENT NUMBER 122979 FOR RAL COLOR NUMBER.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994	DRAWN BY: AMN		Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
	DRAWN DATE: 09-23-09			
	APPROVED BY:		TITLE: RADOME TOP ASS'Y, 81 INCH, TUNED	
	APPROVED DATE:			
MATERIAL: SEE BOM.	SIZE B	SCALE: 1:10	DRAWING NUMBER: 130307	REV: A2
FINISH: N/A	FIRST USED: XX09			SHEET NUMBER: 1 OF 1

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	119707-1	B	BASE FRAME ASS'Y, 80.8 INCH, STEEL, 2	
2	1 EA	135180-1	A	RADOME BASE, 80.8 INCH, WHITE, A/C CU	
3	1 EA	123729-2	H	A/C INSTALL ASS'Y, EXTERNAL, 81" BASE	
4	1 EA	120191-2	C4	RADOME PAN ACCESS ASS'Y, WHITE	
5	3 EA	124903-1	B3	STRAIN RELIEF ASS'Y (CABLE GLAND)	
6	1 EA	111679-25	B	CABLE CLAMP, NYLON, 3/4 DIA, #10 MTG	
7	3 EA	111679-23	B	CABLE CLAMP, NYLON, 5/8 DIA, #10 MTG	
8	1 EA	135171-1	A	FIBER INTERFACE BOX, ADE, DUPLEX ST	
9	3 EA	121226-7014		SPACER, #10 X .38 OD X .13, ALUM, ALO	
10	1 EA	130524-1	A	BRACKET, AC CONTROLLER	
11	1 EA	135170-1	A	CABLE EZENTRY KIT, ROXTECH	
12	1 EA	122360-1	B1	CONN, CIR, C16 FEMALE , 3+PE, C016 20	
13	1 EA	135586-50	A	CABLE ASS'Y, AC PWR TO 48VDC PSU	
14	1 EA	135467-3	A	CIRCUIT BREAKER BOX ASS'Y, 16 AMP W/A	
15	2 EA	114973-12	G	CABLE ASS'Y, COAX, TYPE N, 12 IN.	
16	4 EA	125806-7	A	ROTALOC HEX NUT, SS-1-B38-M4 X 07-6H	
41	3 EA	119745-216		SCREW, PAN HD, PHIL, M4 X 6, S.S.	
42	1 EA	119745-118		SCREW, PAN HD, PHIL, M3 X 8, S S	
48	4 EA	114580-230		WASHER, FLAT, M4, S.S.	
51	2 EA	114588-833		SCREW, PAN HD, PHIL, 10-32 X 1, S.S.	
54	1 EA	114588-831		SCREW, PAN HD, PHIL, 10-32 x 3/4, S.S	
55	12 EA	114580-011		WASHER, FLAT, #10, S.S.	
56	6 EA	114583-011	A	NUT, HEX, 10-32, S.S.	
57	6 EA	114622-546		SCREW, HEX HD, FULL THRD, 1/4-20 x 1-	
58	12 EA	114625-107		WASHER, FENDER, 1/4, (1 IN OD), S.S.	
59	6 EA	114583-029		NUT, HEX, 1/4-20, S.S.	
60	4 EA	114586-675		SCREW, HEX HD, 1/2-13 x 1-3/4, S.S.	
61	8 EA	114580-033		WASHER, FLAT, 1/2, S.S.	

Sea Tel
COBHAM

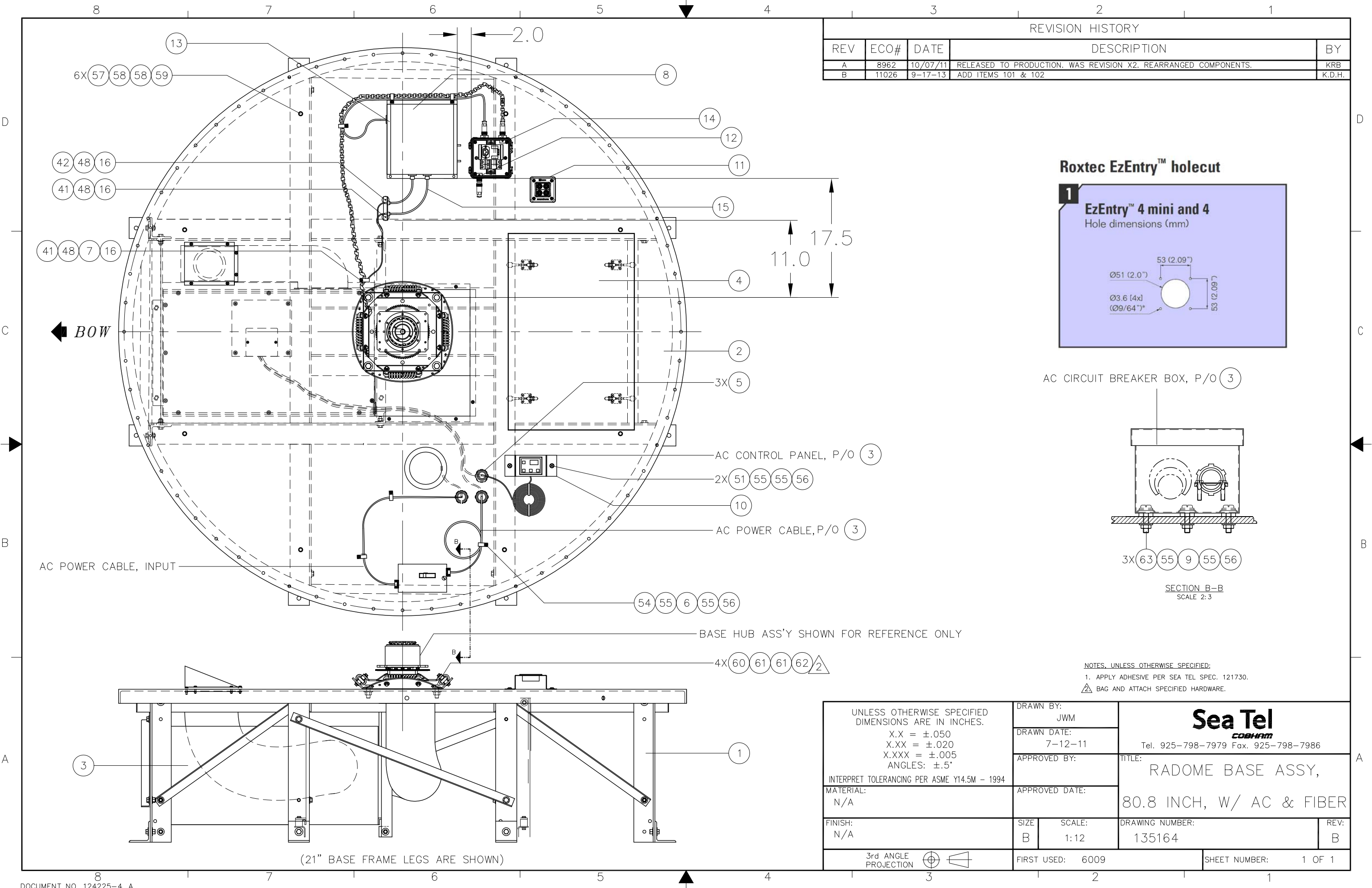
RADOME BASE ASS'Y, 80.8 STEEL. W/AC & FIBER INTERFACE

PROD FAMILY COMMON	EFF. DATE 11/8/2013	SHT 1 OF 2	DRAWING NUMBER 135164-1	REV B
-----------------------	------------------------	------------	--------------------------------------	--------------

SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
62	4 EA	114583-033		NUT, HEX, 1/2-13, S.S.	
63	3 EA	114588-832		SCREW, PAN HD, PHIL, 10-32 x 7/8, S.S	
64	4 EA	117762-1	B	SILICONE ADHESIVE, WHT RTV 122, 10.1	(NOT SHOWN) ,
101	1 EA	131413-2	A	CRATE ASS'Y, 81" RADOME, W/AC OR AC R	
102	1 EA	131414-2	A	CRATE ASS'Y, 81" BASE FRAME, W/AC OR	

				
RADOME BASE ASS'Y, 80.8 STEEL. W/AC & FIBER INTERFACE				
PROD FAMILY COMMON	EFF. DATE 11/8/2013	SHT 2 OF 2	DRAWING NUMBER 135164-1	REV B



REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	8962	10/07/11	RELEASED TO PRODUCTION. WAS REVISION X2. REARRANGED COMPONENTS.	KRB
B	11026	9-17-13	ADD ITEMS 101 & 102	K.D.H.

Roxtec EzEntry™ holecut

1

EzEntry™ 4 mini and 4
Hole dimensions (mm)

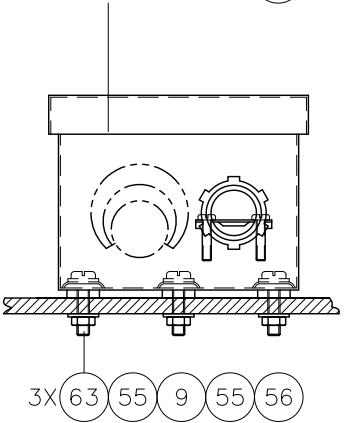
Ø51 (2.0")

Ø3.6 [4x]
(Ø9/64")*

53 (2.09")

53 (2.09")

AC CIRCUIT BREAKER BOX, P/O 3



SECTION B-B
SCALE 2:3

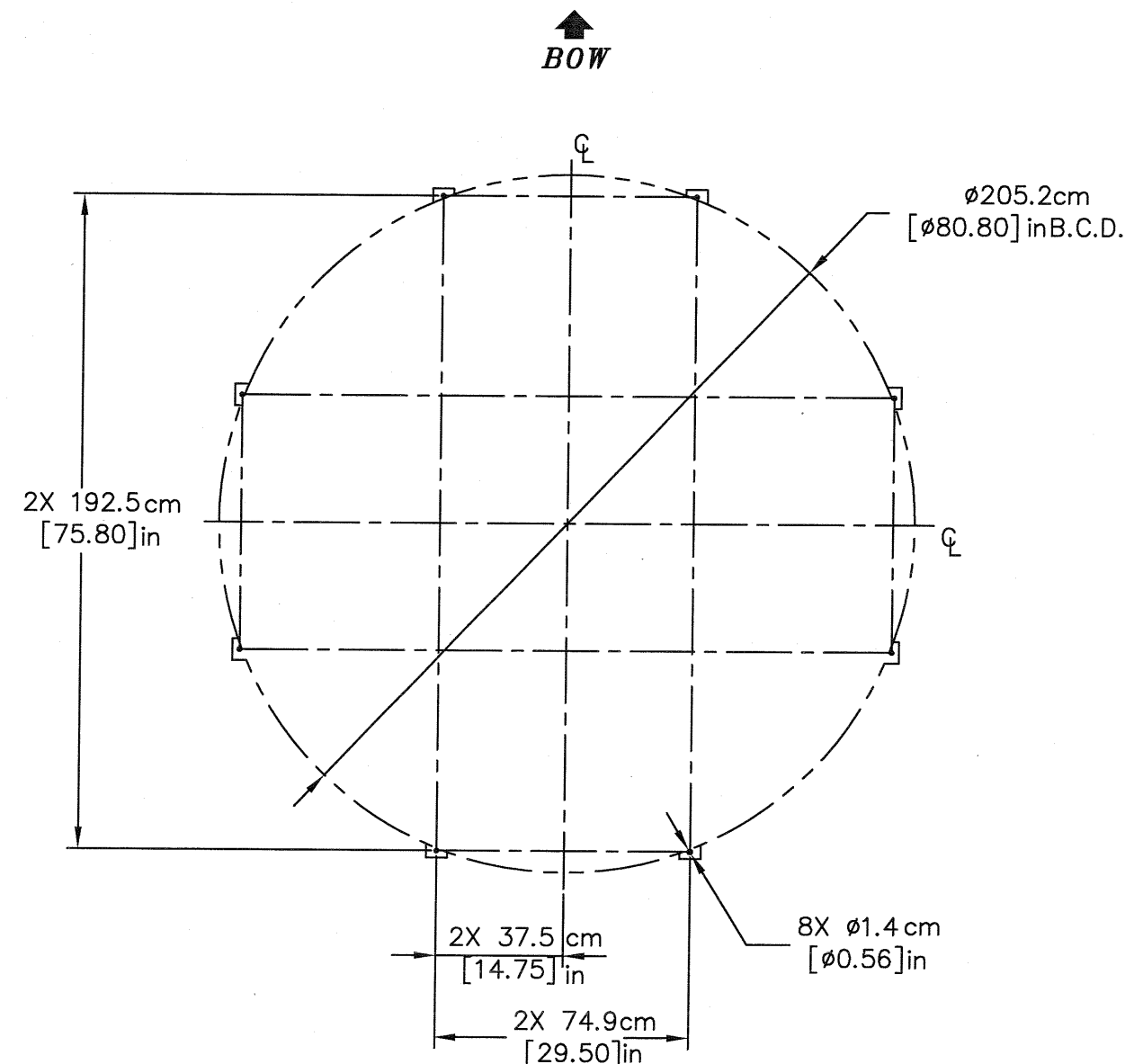
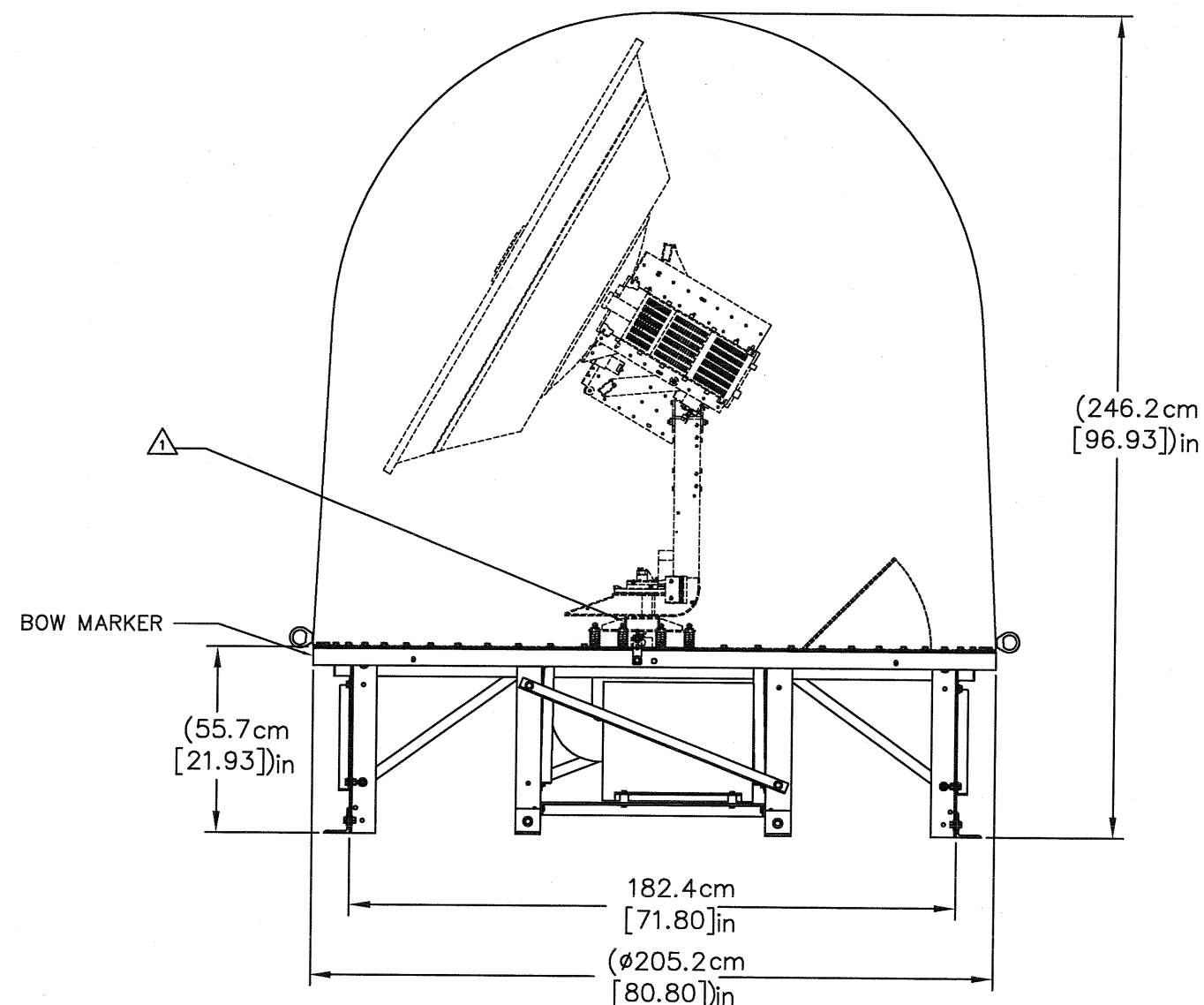
- NOTES, UNLESS OTHERWISE SPECIFIED:
- 1. APPLY ADHESIVE PER SEA TEL SPEC. 121730.
 - BAG AND ATTACH SPECIFIED HARDWARE.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. X.X = ±.050 X.XX = ±.020 X.XXX = ±.005 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M – 1994	DRAWN BY: JWM		Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
	DRAWN DATE: 7-12-11			
	APPROVED BY:		TITLE: RADOME BASE ASSY, 80.8 INCH, W/ AC & FIBER	
	APPROVED DATE:			
MATERIAL: N/A	SIZE B	SCALE: 1:12	DRAWING NUMBER: 135164	REV: B
FINISH: N/A	FIRST USED: 6009			SHEET NUMBER: 1 OF 1

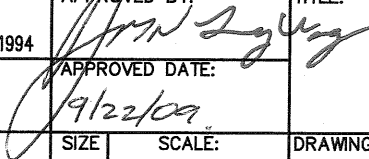
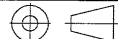
NOTES: UNLESS OTHERWISE SPECIFIED

- △ 'BOW' WILL BE INDICATED ON SYSTEM. TO VERIFY, CHECK THAT THE LOWER AZ STOP PIN ON THE GA IS BOW SIDE OF CENTERLINE.
- REFER TO DOC. NO. 130040 FOR INSTALLATION GUIDELINES.
- DIMENSIONS ARE IN CENTIMETERS, [INCHES IN PARENTHESES], TOLERANCE $\pm .5$ MM

REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	N/A	11-06-06	RELEASED TO PRODUCTION FROM REV. X1.	TP
A1	N/A	09-22-09	DIMS WERE INCH ONLY; DEL PAGE 2, (WEIGHTS TBD); ADDED NOTES 2, 3.	AMN



MOUNTING HOLE PATTERN

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS. X = ±1.50 X.X = ±0.50 X.XX = ±0.15 ANGLES: ±.5° INTERPRET TOLERANCING PER ASME Y14.5M - 1994		DRAWN BY: T. PATEL		Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
		DRAWN DATE: 09-01-06			
MATERIAL: N/A		APPROVED BY: 		TITLE: INSTALLATION ARRANGEMENT, 80.8 IN RADOME	
		APPROVED DATE: 9/22/09			
FINISH: N/A		SIZE B	SCALE: NONE	DRAWING NUMBER: 125804	
3rd ANGLE PROJECTION 		FIRST USED: 6006			SHEET NUMBER: 1

Procedure, Radome Strain Relief Installation

- 1.0 Purpose.** To define the installation procedure for installing strain reliefs in "smooth base" radomes.
- 2.0 Scope.** This installation procedure applies to fiberglass radomes having Sea Tel's standard four-hole mounting pattern, and M12 mounting hardware, in the 80-180 cm (34-66 in) nominal size range, typically referred to as "smooth" base radomes. It also applies to our larger 193 cm (76-inch) radome having a twelve-hole mounting pattern. It is to be used where the preferred center cable exit may not be desired.
- 3.0 Tools/materials.**
1. Electric drill.
 2. Small drill bit 1/8" dia. (3-4mm dia.).
 3. Hole saw, 1 3/8" dia. (35 mm), with mandrel and 1/4" dia. pilot drill.
 4. Medium file.
 5. Two 1-1/2" (38 mm) adjustable pliers.
 6. #2 Phillips screwdriver.
 7. Fiberglass resin & catalyst, (marine grade) - at least 2 oz (50 cc).
Such as Tap Plastics Marine Vinyl Ester Resin with MEKP Catalyst.
Note: Use liquid resin, instead of paste type, due to better penetration.
 8. Mixing cup – 4 oz (100 cc).
 9. Disposable brush.
 10. Strain Relief Assembly 124903-1, (one per cable).
- 4.0 Responsibilities.** It is the responsibility of the installer to observe all standard safety precautions, including eye, slip, and chemical protection when performing this procedure.

4.1 Procedure.

Remove the standard cable pass through assembly 130818-1*

* N/A for 193 cm (76-inch) nominal size radomes. Refer to Fig 1, then use #2 Phillips screwdriver to remove 4 ea. attachment screws.

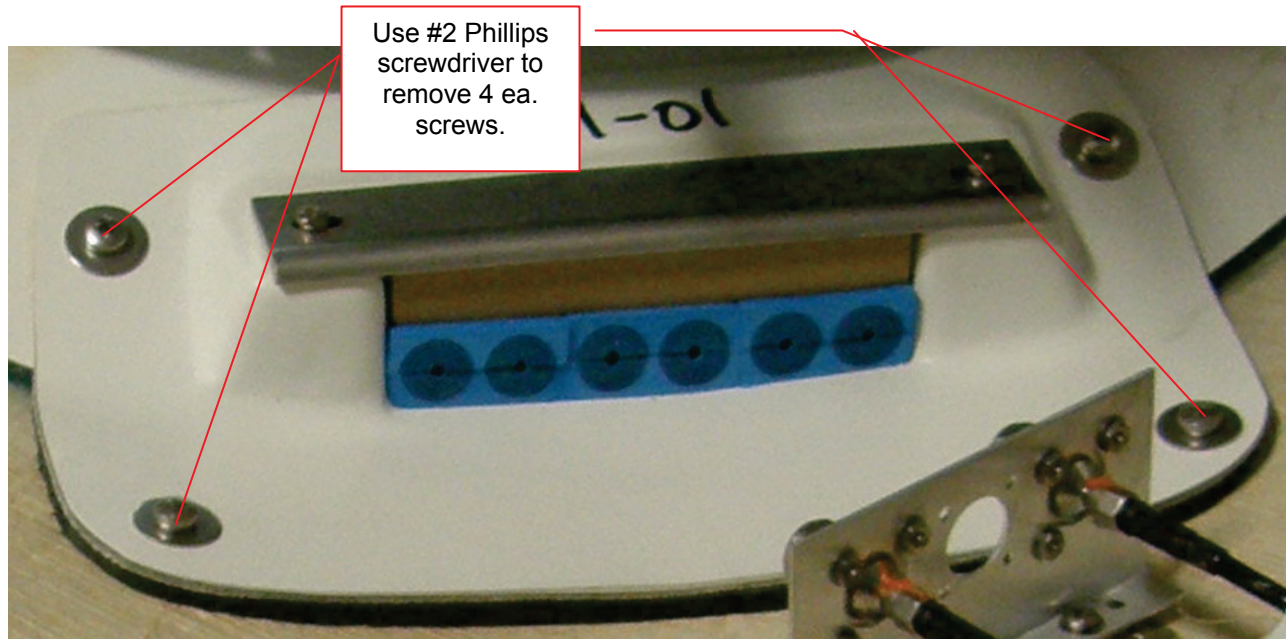


Fig. 1 – Cable pass-thru assembly

Procedure, Radome Strain Relief Installation

4.2 Making the holes

PLANNING: Space has been allowed for up to 5 ea. strain reliefs, but, install only as many as needed. (Typically only 2-3 for TX/RX systems). Refer to Fig 2 then plan which hole positions to use.

For 76-inch radomes lowest holes may be approx 1.5 inches from inside wall corner with floor (ref drawing 129416).

Note: The hole center-to-center distance given is the MINIMUM.

Follow good engineering practice and provide the largest spacing possible between holes as follows:

- 1 Hole pattern - "A".
- 2 Hole pattern - "B", "C".
- 3 Hole pattern - "A", "B", "C", ("A", "D", "E" PERMITTED).
- 4 Hole pattern - "B", "C", "D", "E".
- 5 Hole pattern - "A", "B", "C", "D", "E".

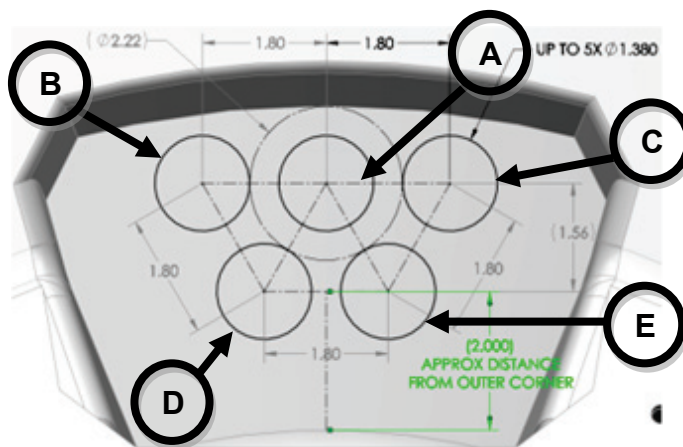


Fig. 2 – Planning
Measure in place or use
template drawing 132234



Fig. 3 – (Up to) 5-Hole Pattern

Procedure, Radome Strain Relief Installation

4.3 Measure, mark and drill pilot holes

CAUTION: The hole locations cannot be determined accurately from outside of the radome.

Using full scale drawing 132234, provided in the strain relief kit, measure mark and drill pilot holes from the inside out, and using only light pressure, use the small drill bit, (~1/8" dia) to make a pilot hole through each planned location.

4.4 Use the hole saw from the outside with light pressure.

CAUTION: Using the hole saw from the inside is likely to damage the Gel Coat.

CAUTION: Heavy pressure on the hole saw from the inside is likely to damage the Gel Coat and splinter the fiberglass.

Working from the outside, use a 1-3/8" hole saw to make the holes for the planned strain reliefs.

4.5 After holes are drilled CAREFULLY use a file to clean the hole edges.

4.6 Test fit the strain reliefs in each location, then, make adjustments as necessary.

4.7 Sealing the hole edges.

CAUTION: Cut edges can allow water and/or ice ingress and weaken the fiberglass laminate or structural foam. It is essential to seal all cut edges thoroughly with fiberglass resin to preserve the radome's structural strength.

CAUTION: Fiberglass paste or RTV silicone sealant will not wick into and seal the fiberglass strands as well as fiberglass resin, ONLY use fiberglass resin (such as TAP PLASTICS MARINE VINYL ESTER, or equivalent) for sealing the cut edges.

Follow the manufacturer's instructions to mix a small amount of fiberglass resin and catalyst, then working quickly, use a disposable brush to apply mixed fiberglass resin to the hole edges, both inside and out.

Allow the fiberglass resin to set per resin manufacturer's instructions.

Note: Like all chemical reactions, set time will be temperature/humidity dependent.

4.8 Refer to strain relief assembly drawing 124903

Being careful not to damage either the radome or the strain relief threads, use adjustable pliers to install strain reliefs.



Fig. 4 – Outside view.

Procedure, Radome Strain Relief Installation



Fig. 5 – Outside view.

4.9 Rotate General Assembly (G.A.)

Once cables have been installed, rotate General Assembly (G.A.), to ensure cables are routed properly and do not interfere with azimuth rotation.



Fig. 6 – Inside view.

5.0 Records. N/A.

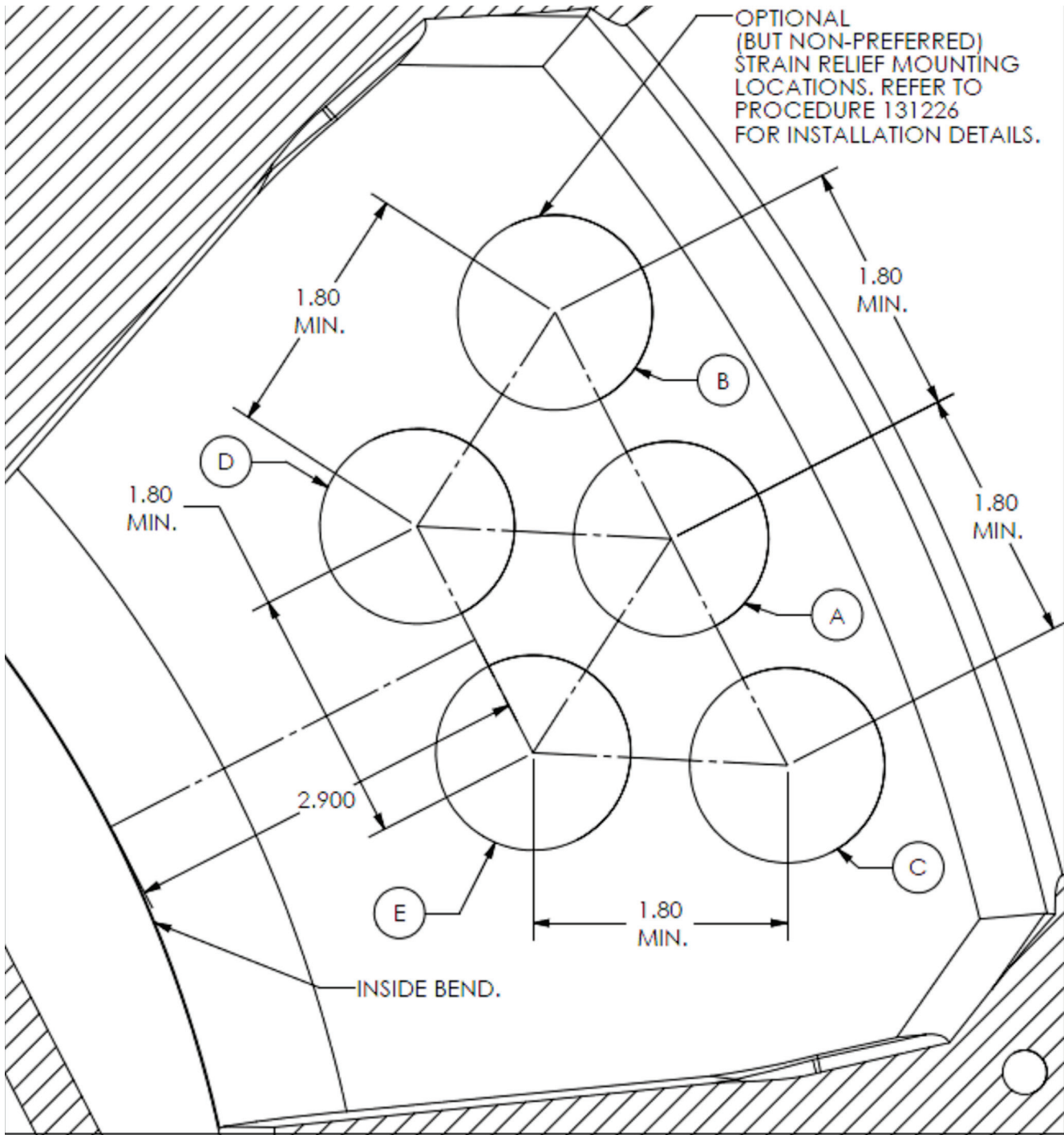
6.0 Training. N/A

7.0 References.

Strain relief assembly drawing (P/N: 124903)
Template drawing (P/N 132234)

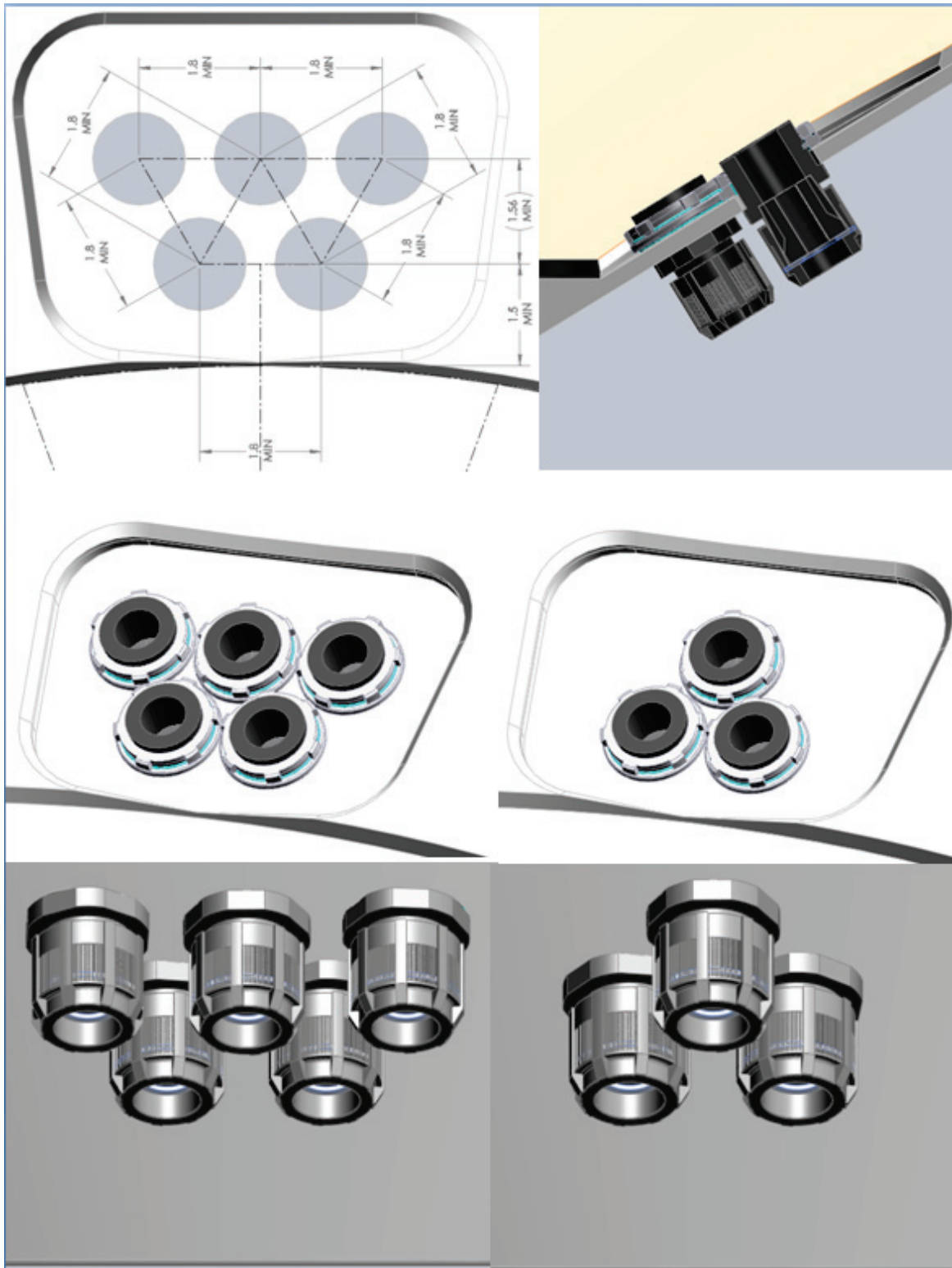
Procedure, Radome Strain Relief Installation

8.0 Strain relief positioning for 80-180 cm (34-66 in) smooth based radomes, (May use Sea Tel drawing 132234 as template.)



Procedure, Radome Strain Relief Installation

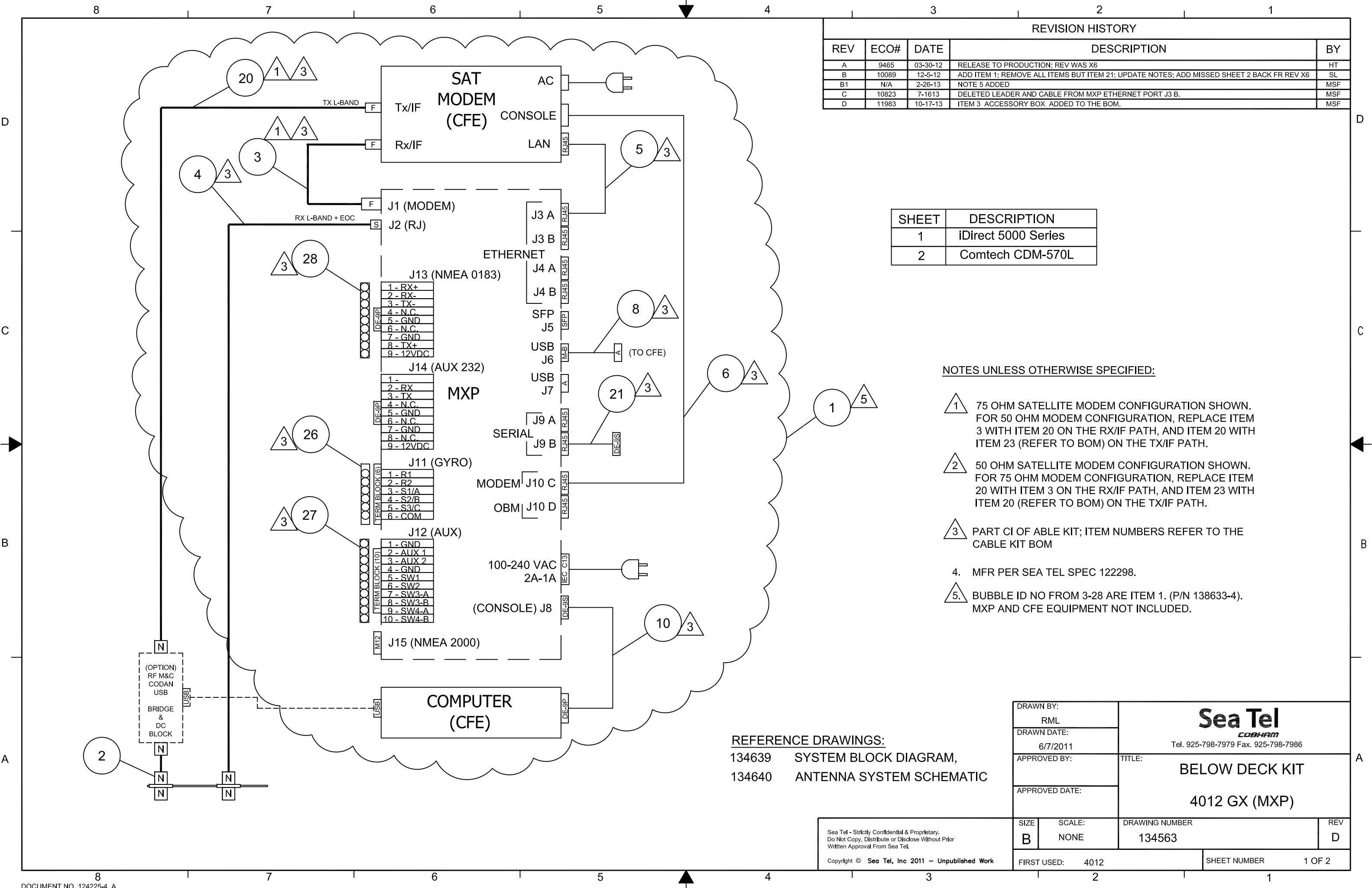
9.0 Strain relief positioning for 193 cm (76-inch) radomes. (May use Sea Tel drawing 132234 as template.)



SINGLE LEVEL MFG BILL OF MATERIAL

FIND	QTY	PART NO	REV	DESCRIPTION	REFERENCE DESIGNATOR
1	1 EA	138633-4	B	BDE CABLE KIT, 4012GX (MXP)	
2	1 EA	136872	A1	BRACKET ASS'Y, CONNECTOR, RACK MOUNT	
3	1 EA	139410	B	BOX, ACCESSORY	

Sea Tel COBHAM				
BELOW DECK KIT, MXP				
PROD FAMILY COMMON	EFF. DATE 11/8/2013	SHT 1 OF 1	DRAWING NUMBER 134563-1	REV D



REVISION HISTORY				
REV	ECO#	DATE	DESCRIPTION	BY
A	9465	03-30-12	RELEASE TO PRODUCTION; REV WAS X6	HT
B	10089	12-5-12	ADD ITEM 1; REMOVE ALL ITEMS BUT ITEM 21; UPDATE NOTES; ADD MISSED SHEET 2 BACK FR REV X6	SL
B1	N/A	2-26-13	NOTE 5 ADDED	MSF
C	10823	7-1613	DELETED LEADER AND CABLE FROM MXP ETHERNET PORT J3 B.	MSF
D	11983	10-17-13	ITEM 3 ACCESSORY BOX ADDED TO THE BOM.	MSF

SHEET	DESCRIPTION
1	iDirect 5000 Series
2	Comtech CDM-570L

NOTES UNLESS OTHERWISE SPECIFIED:

- 1

75 OHM SATELLITE MODEM CONFIGURATION SHOWN. FOR 50 OHM MODEM CONFIGURATION, REPLACE ITEM 3 WITH ITEM 20 ON THE RX/IF PATH, AND ITEM 20 WITH ITEM 23 (REFER TO BOM) ON THE TX/IF PATH.
- 2

50 OHM SATELLITE MODEM CONFIGURATION SHOWN. FOR 75 OHM MODEM CONFIGURATION, REPLACE ITEM 20 WITH ITEM 3 ON THE RX/IF PATH, AND ITEM 23 WITH ITEM 20 (REFER TO BOM) ON THE TX/IF PATH.
- 3

PART CI OF ABLE KIT; ITEM NUMBERS REFER TO THE CABLE KIT BOM
- 4

MFR PER SEA TEL SPEC 122298.
- 5

BUBBLE ID NO FROM 3-28 ARE ITEM 1. (P/N 138633-4). MXP AND CFE EQUIPMENT NOT INCLUDED.

REFERENCE DRAWINGS:

- 134639
- SYSTEM BLOCK DIAGRAM,
- 134640
- ANTENNA SYSTEM SCHEMATIC

DRAWN BY: RML		Sea Tel COBHAM Tel. 925-798-7979 Fax. 925-798-7986	
DRAWN DATE: 6/7/2011			
APPROVED BY:		TITLE: BELOW DECK KIT 4012 GX (MXP)	
APPROVED DATE:			
SIZE B	SCALE: NONE	DRAWING NUMBER 134563	REV D
FIRST USED: 4012		SHEET NUMBER	1 OF 2

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